ALABAMA DEPARTMENT
OF TRANSPORTATION

Construction Manual

BUREAU OF CONSTRUCTION

FOREWORD

This Construction Manual has been prepared for the information and guidance of Highway Engineering personnel and is a compilation in written form of the field experience and judgement of those ALDOT engineers with significant construction experience.

It should be realized that this Manual is not a part of the official binding contract documents that include plans and specifications. However, it is written in part to clarify the contract documents and will refer to them at various points in the text. The contract documents will govern in any case of apparent conflict with this Manual, and this Manual does not in any case constitute authority for an employee to take action contrary to the contract documents. This Manual purposely refrains from repeating instructions that are spelled out in the contract documents; hence it is necessary to take this Manual and the contract documents together to cover the duties of the Engineer and Inspectors.

Since this Manual is to be used in conjunction with the Department's Standard Specifications, it will be necessary to make changes in the Manual as changes are made in the specifications.

The hierarchy of the contents of the various subjects covered in this Manual is divided into Parts, Parts into Sections, Sections into Articles, and Articles into Subarticles.

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Users of this Manual, who discover any error, omission, or obsolescence in the information provided in it's contents should bring it to the attention of the State Construction Engineer, Alabama Department of Transportation, Construction Bureau, 1409 Coliseum Blvd; Montgomery, Alabama 36130-3050.

THIS COPY OF ALDOT CONSTRUCTION MANUAL

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1:2 CONTRACT ADMINISTRATION

1:2:A PROJECT ENGINEER RELATIONS

1:2:A:1.1 Relations with Contractors and Suppliers

A Project Engineer's first contact with the fast-moving, demanding duties of supervising a modern highway construction project can be a confusing and frightening experience unless he/she has a clear idea of the proper deportment required by his/her responsibilities and has a basic knowledge of how to handle himself/herself.

The aim and mission of the Engineer in charge of a construction project is to insure a wholly satisfactory job built in accordance with the plans and specifications under which the contract was awarded. In carrying out this mission he/she is thrown into constant contact with the Contractor and his/her representatives and often suppliers of materials and services. These contacts can be business-like and dignified, or they can be sources of friction and hostility. For a successful operation it is necessary that a businesslike relationship based on mutual respect be developed.

With that in mind, a good approach is the establishment of a regular schedule of job conferences for discussion of problems and schedules. Conferences should be held at regular and frequent intervals. Special conferences should be quickly arranged when emergencies, disagreements or any indication of friction or trouble develops. To be effective, those participating must strive for an atmosphere of mutual respect. It must be kept in mind that respect is not a commodity that is for sale. It must be earned by the day in, day out, practice of fair play and honesty.

It is well to understand that most Contractors today are business people and that relations with them have to be on a business basis. They are in business to make money. Most of them intend to do their job properly. If they can develop a method of producing the desired result more economically, the Project Engineer should go along as far as the specifications will allow The Contractor is not "the enemy", but a business person with whom the State has entered into a contract. Contractors risk their investments in machinery and payrolls with the hope of realizing a profit, and there is nothing wrong in that so long as the State gets a full return for its money. With that in mind, one principle governing Engineer-Contractor relations is that a Contractor should never be ordered to do any work unless the method of paying him/her for it is indicated in the contract or by subsequent Supplemental Agreement, Change Request or Force Account.

Communication of instructions to the Contractor, his/her superintendent or foreman should be done in a business-like, courteous manner. The Project Engineer should be firm without being overbearing. When one is sure of his/her grounds, his/her authority and his/her means of enforcing it, there is no need for recriminations or undignified arguments. On the other hand, no Project Engineer or Inspector can be expected to take abuse from a Contractor or his/her representatives. Here, it is up to the District, Division and/or Central Office administrators of the Department of Transportation to deal promptly and decisively with any instances of improper language or threats used against a Project Engineer or Inspector.

The Project Engineer should avoid dealing directly with laborers and equipment operators he/she must avoid trying to actually "run the job" or to supervise the Contractor's personnel. The Project Engineer's job is to see that the desired results are achieved. The method of achieving them is up to the Contractor, except where method is specified. He/she should tell the superintendent or foreman what is wanted, then see that it is performed.

The engineering and inspection people, charged with safeguarding the public's interest, must not only be efficient and incorruptible they must also scrupulously avoid any action that might be misinterpreted or misrepresented. There is no substitute for plain honesty. To solicit or accept a bribe or a gift from a Contractor would be an act that would place the individual so doing in jeopardy of dismissal and possibly criminal prosecution. There are, of course, Contractors and suppliers who offer unsolicited presents, favors, entertainment and bribes to Engineers and Inspectors hoping to obtain favored treatment or relaxed control. An individuals personal integrity and self-respect require that such offers be rejected. A person who accepts a lavish gift or unusually elaborate entertainment has placed himself/herself under obligation to the giver. Both the giver and receiver of such favors have demeaned their personal self-respect and destroyed any mutual respect that might have existed. Almost inevitably, someone or some agency discovers such transactions with resulting disgrace to both parties. Widespread and even isolated transgressions undermine the public's confidence in the whole industry. No matter how lavish the gift, it is not worth the destruction of a career and the loss of the respect of friends, associates and family.

It is not necessary to carry this situation to such unreasonable lengths as to refuse the offer of a coke or insignificant things. A stiff-necked, unfriendly demeanor only succeeds in making a person look ridiculous. Such favors as frequent lunches or dinners should be declined with thanks. Often the intent is cordial, and the one who makes the offer does so out of simple friendliness. If one's judgment tells him/her that acceptance of the offered hospitality might be indiscreet, might be misconstrued or that he/she would feel under the least obligation, he/she should decline it graciously. The Engineer or Inspector must treasure his/her personal integrity and jealously guard his/her reputation. Summing up, in dealing with Contractors and suppliers everything must be kept on a business-like basis and no favor, however small, accepted which engenders any feeling whatsoever of obligation to that individual or company.

1:2:A:1.2 Relations with Public

The Project Engineer is one of the most important elements in any Transportation Department's public relations. In that position he/she is continually in contact with the people who live alongside the road that is under construction and with the traveling public. To them he/she represents the State. With all of these people he/she must be patient and courteous at all times. Many times he/she will be subject to unkind remarks from bordering residents and passing motorists. Bearing in mind that he/she is not just an individual, but the actual representative of the State who is his/her employer, he/she must meet such attacks with patience and dignity. He/she should explain the situation if possible and admit if a mistake or oversight has been made. The Project Engineer should do his/her best to correct the situation if he/she is at fault. Examination of the operation of maintaining traffic carefully is vital. He/she must put himself /herself into the frame of mind of a driver who is unfamiliar with the job, and sees what such a person would need for his/her guidance. Remember, in the last analysis, the traveling public and residents are the people who are paying the salary of the Project Engineer, as well as paying for the construction project.

Good relations with the people with whom one is in daily contact are not the result of an occasional effort. They require constant thought and a sincere desire to anticipate people's needs and wants. Road building operations upset many people's daily routine of living. It represents a major change in the pattern of daily travel of residents and business people whose homes and properties abut the highway under construction. Their possessions, as well as their comfort and convenience, are involved. Most of them have no conception of the problems of the road builder. They feel that they were there first and that they are entitled to the conveniences to which they have become accustomed. Their viewpoint must be understood in order to deal patiently with their demands and criticisms.

There are many services such as mail delivery, food deliveries, bus service, etc. for which special provision must be made. The Contractor has as large an interest in promoting local goodwill, as does the Engineer. His/her cooperation must be sought in providing for these necessities. Roadside merchants

whose livelihood depends on doing business with the travelers have special problems, which to them are all important. It is good practice to make their acquaintance, ascertain any especially vital needs they may have and arrange to accommodate them if it is possible. Always leave them your name and phone number. Reasonable and safe access to homes and businesses must be maintained at all times during construction. Oftentimes construction schedules can be arranged at mutually convenient times, or other gestures of goodwill made that take a lot of the annoyance and hardship out of the period of construction. Just the fact that the person has a chance to state his/her problems and get sincere and courteous consideration goes a long way toward avoiding the bitterness and anger that could otherwise develop. A Project Engineer must always be willing to confer with these people and to give their problems careful thought.

Another group with which the Project Engineer has frequent contact is the elected or appointed officials of the locality, which the project traverses. Local residents turn to these officials with their complaints and problems. As their representative the official must relay their complaints and seek relief for them. These governmental officials invariably appreciate the courtesy of being kept informed. When emergency services, such as police, fire, ambulance, etc. must be rerouted as a result of project operations, the Project Engineer must assure himself/herself that the proper City and/or County officials have been given ample advance notification.

The local press will also take a lively interest in any road construction in its area of coverage. While the reporter may have very little knowledge of road construction, he/she probably is well acquainted with residents of the locality. His/her questions may be based on comments from them. Each Division will usually have a policy concerning persons authorized for press releases. If the Project Engineer is not authorized or does not feel that he/she should make such releases, a pleasant reply simply stating that he/she is not authorized to make releases to the press is usually adequate. He/she should then supply the reporter with the name and telephone number of his/her Division Engineer. In any case, any statements made to reporters must be based on facts, avoiding predictions or assumptions, since reporters are not familiar with engineering terms and will often misconstrue or misinterpret your statements.

1:2:A:1.3 Relations with his/her Supervisor

During the course of a construction project, numerous inspection visits will be made by the District Engineer, Division Engineer and his/her assistants, FHWA representatives, if a Federal-aid project, and representatives of the Central Office. All contacts with the Project Engineer from representatives outside the Division should be coordinated through the Division Office.

Inspection visits made by the above mentioned offices are made for the sole benefit of aiding and assisting the Project Engineer with problems which he/she is facing each day. All criticism of practices which do not come up to desired standards should always be made in a constructive manner and should be accepted as such by the Project Engineer. All questions directed to the Project Engineer must be answered honestly even if he/she knows that his/her answer will be in conflict with Specification requirements. In areas that are in conflict with Plan and Specification requirements, the Project Engineer must always express a willingness to promptly correct such situations. Only through such relationships will the spirit of mutual respect be acquired which is so necessary in achieving a job of which we can all be proud.

If a Project Engineer is devoted to achieving a good job for the traveling public and has the interest of the Department of Transportation at heart, he/she will welcome numerous visits by his/her supervisors.

With this type attitude he/she will have gained their respect, and their attitude in turn will always be in a helpful nature.

1:2:A:1:4 Relations with Project Personnel

The art of supervising and directing the efforts of other men is one for which some people are fortunate enough to have a natural ability. Most people have to develop it. Engineers, because of their precise, mathematical and scientific approach to situations, are generally among the latter. Their supervisory skills usually are developed in the school of actual experience.

There is no better training in the art of supervision than the day to day work and responsibilities of the Project Engineer. He/she soon learns that one who controls others must first learn to control himself/herself. There is no room for temper outbursts. There is no place for indecision or evasion of responsibility. To gain the respect of his/her subordinates he/she must obviously merit respect. He/she earns respect by knowing his/her job, knowing his/her organization, by showing consideration for the problems of those he/she supervises and by firmness and level-headedness in emergencies and disagreements. In handling a construction project, a man is preparing himself/herself for greater responsibilities. By being aware of that fact and observing intelligently the results of his/her actions, a man cannot help but derive great benefits from his/her job.

The men assigned to help the Project Engineer on the job are under his/her full control. The Project Engineer is responsible for the quality and quantity of their work. Discipline and control are up to him/her. There is no need for him/her to be overbearing. It is possible and desirable to be firm yet pleasant. Defiance of his/her authority must not be permitted. At the same time, he/she should never discipline a subordinate in a manner that will humiliate him/her in the eyes of his/her colleagues or the men he/she, in turn, must supervise. Such a subordinate should be taken aside to correct him/her. It is also important that the Project Engineer be as free with praise for a good job as he/she is with criticism for a poor one.

One of the great problems of supervision is that of maintaining the personal relationship between the supervisor and the supervised. Being a supervisor is sometimes a lonely job. A supervisor may be friendly but not familiar, and certainly must avoid even a hint of partiality or favoritism.

A good supervisor will make sure that his/her helpers understand exactly what is required of them. He/she will indicate clearly to whom they are to report, from whom they are to receive instructions and the extent of each individual's responsibility. By the same token, he/she must fully understand the extent of his/her own authority and responsibility, and to whom he/she is responsible. Confusion in the field of authority and responsibility can only result in poor supervision. A Project Engineer should not only issue instructions, but should also provide guidance to his/her personnel. He/she must also follow-up on all instructions to assure that personnel have understood him/her and have followed through with their assignment.

One of the proven methods of obtaining the voluntary cooperation of a subordinate is to build his/her self-esteem. This is not done by transparent or effusive flattery. It is achieved by impressing on him/her the importance of his/her particular task, and making him/her understand its part in the production of a good end product. It is assisted by a quiet word of praise for a job well done. Listening carefully to his/her ideas and suggestions, and by using them whenever they are sound. When his/her idea or suggestion is implemented, be sure that he/she receives full credit for it.

When a man, especially a new one, exhibits the wrong attitude, it is wise to offer a helping hand. This should be done quietly and privately in order to avoid embarrassing him/her in front of his/her fellow workers. That kind of consideration can pay excellent dividends. If the man does not respond to courteous corrective measures, then, and then only, is it time to employ firmer measures. This, too, should be done in private and without humiliation to preserve and protect the dignity of both the employee and supervisor, and the morale of the organization.

It is good policy to keep subordinates informed of changes in plan or policy unless such changes are of a highly confidential character. This imparting of information should be accompanied by a careful explanation of the motivations and reasoning behind the changes. Frequent conferences with subordinates to discuss job problems are a good idea. While not relinquishing in the least the power of final decision, a supervisor can impart tremendous team spirit by consulting with his/her subordinates before making the final decision. They feel that they "belong" and that their thoughts are respected. A man who feels that way has self-respect, and his/her loyalty to the organization will never be in doubt.

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1:2:D Contract Administration (Contract Letting, Award and Execution of Contract)

Contract lettings will generally be held on the last Friday in each month, but special lettings may be held on pre-announced dates. Normally projects to be let will be advertised in newspapers and by notices to all qualified bidders at least four weeks prior to letting. This advance notice allows the Contractor time to review all plans, specifications, and special provisions and to make an on-site inspection with core borings and drillings of the project if he/she feels such necessary. During this four-week period, the Contractor will also check on the availability of material sources in the area and will attempt to locate possible pit sources. An exception to the above is projects let under an emergency declaration where by law the advertising period is waived.

Bid proposals will be opened at 10:00 a.m. on the Friday letting usually in the Department of Transportation Building at 1409 Coliseum Boulevard in Montgomery. The Proposal Engineer opens proposals and the total bid amount read out. Some proposals may be rejected at this time due to omissions, discrepancies, inadequate signatures, bonds etc. Acceptable proposals are then checked for mathematical accuracy by Computer Services and any discrepancies are corrected in accordance with the specifications. The submitted proposals, with corrected totals where such corrections can be made in accordance with the specifications, are then tabulated and submitted to the Bid Review Committee for recommendation of award to the Transportation Director.

After concurrence by the Transportation Director and if a full involvement federal-aid project, the tabulated bids will be submitted to the Federal Highway Administration for their concurrence.

The lowest responsible and responsive bidder, whose proposal complies with all specification requirements, will be notified of contract award within 30 days after the opening of bids, unless otherwise stipulated in accordance with Subarticle 103.02(a) of the Standard Specifications. After award and submission of the contract to the Contractor, the Contractor must properly execute the contract and return to the Director of Transportation within 15 days with proper signatures and all necessary performance bonds. After receipt by the Director, the Director will have a period of 20 days to execute the contract on behalf of the Department and receive approval of the Governor. After final execution of the contract by the Governor, the Department will issue the "notice to proceed" to the Contractor within 15 calendar days. Unless otherwise specified in the contract or directed in writing by the Engineer, the Contractor will be expected to begin work within 15 calendar days after issuance of the notice to proceed.

Prior to the pre-construction conference, but no later than 10 days from date of notice to proceed, the Contractor shall submit a satisfactory comprehensive bar graph schedule of operations to the Division Engineer on all projects which have a contract time in excess of 90 working days or 180 calendar days. This schedule shall be on **Form C-10** and submitted directly to the Division Engineer for consideration and approval.

A Pre-Construction Conference shall be scheduled by the Division Office, prior to the date of the "notice to proceed," to discuss the plans, specifications, schedule of operations and special problems anticipated during the course of the project. After the Pre-Construction Conference, the prosecution and progress of the Contractor will mainly rest with the Contractor's field superintendent. Engineering controls for all layout and construction of items within the contract may rest with either the Contractor, dependent upon the inclusion of item 680-A, engineering controls, or with the State’s project engineer in the absence of item 680-A, engineering controls, from the contract. Enforcement of the specifications will rest with the State's Project Engineer.

All quantities should be measured as accurately as possible. Most Contractors, but not all, will have as one of their aims to construct a satisfactory project, which will give the taxpayers their "dollars worth" and serve the traveling public well. Project personnel should assure that this aim is achieved through proper enforcement of plan and specification requirements.

1:2:E CONTRACT ADMINISTRATION (PROJECT, FIELD AND OFFICE ENGINEERING)

1:2:E:1:1 Field Engineering (General)

Upon being assigned to a project, the Project Engineer must first find and furnish an adequate field office. This office should be as close to the project as possible. It should be maintained in a clean, presentable condition at all times which may necessitate painting, repairing, etc. before occupying the office. It will definitely require daily sweeping and periodic cleaning of rest rooms, windows, etc. to maintain clean and sanitary conditions at all times. This will give project personnel more enjoyable working conditions and should leave visitors with a more favorable impression.

The Project Engineer should then become acquainted with the area, and as occasions arise, he/she should visit with and introduce himself/herself to public officials, property owners adjacent to the project and local business owners. In talking with these persons, the Project Engineer should offer to help with any problems, which might arise due to construction and leave his/her name and telephone number.

1:2:E:1.2 Organization Preliminary work

After the Project Engineer is established in the area of the project and has at least three sets of plans, (one for the District Engineer, one for office records, and one for field use) he/she should secure from the District Engineer any field notes available for the project. He/she should turn over one set of the plans and the field notes to the Chief of Party with instructions to re-establish the centerline of the project, rerun the check levels, re-cross section the project completely, and stake out the right of way.

While the re-survey work is being done and field note books are being made up for future use, the Project Engineer should check all the quantities on the plans to satisfy himself/herself as to where they are to be used in the work and whether accurate and sufficient. Each Inspector should be familiar with the details pertaining to his/her part of the work. Any quantities that appear to be seriously out of proportion should be brought to the attention of the District Engineer.

The Project Engineer should study the Contractor's Progress Schedule (required in Article 108.03) and plan the sequence of staking and inspection activities of the engineering personnel to conform to that schedule.

The Project Engineer, with the Chief Inspector, should study the soil profile and formulate a plan for grading operations to best utilize rock excavation and to reserve material for capping rock fills. Plans should be made to avoid stockpiling capping material to the extent practicable, to avoid re-handling costs. The Project Engineer and Chief Inspector must obtain District and Division records of sampling for CBR data and standard Proctor density. A schedule for check sampling of cut sections should be worked out after further study of the soil profile and the Chief Inspector should assign men to secure these samples and establish additional standard PD's as needed. In-place moisture content should be carefully noted.

A basic requirement for the Project Engineer and Inspectors on the new job is a thorough knowledge of the plans and specifications. Lack of knowledge that certain provisions were in the specifications or on the plans can never be accepted as an excuse for a mistake. Special provisions in particular should receive thorough study since they affect the project directly. The Inspector must be familiar with the specifications in general and especially with the portions covering the pay items within his/her inspection duties. The Inspector who demonstrates that he/she is thoroughly familiar with the specifications and with the scope of his/her work, commands the respect of the Contractor's personnel; and his/her reasonable directions will be carried out promptly and with-out question.

1:2:E:1.3 SITE INSPECTION.

As soon as the survey party has re-established the centerline and assuming that the Project Engineer and Inspectors are thoroughly familiar with the plans and specifications by that time, the Project Engineer (unless he/she was on the preliminary location work and P.S.& E. inspection and hence thoroughly familiar with the site) should arrange with the District and/or Division Construction Engineer for an inspection on the ground with plans in hand. At that inspection plans should be checked carefully against actual ground conditions and any apparent inconsistency or omission investigated and corrected as necessary, including the following special features:

1. Check all drainage structure plan locations against the ground conditions. Minor structures especially can sometimes be shifted from the plan location to good advantage. Flow line elevation, cross fall and out fall situations especially should be checked to insure drainage away from the project. A view of the drainage areas may reveal an obviously incorrect size of opening.

2. Note areas where early use of temporary erosion control will be necessary to properly retain erodible soils within the right-of-way.

3. Note all obstructions, pole lines, fences, etc., on the right-of-way. These are to be discussed in a conference to be handled later. Proposed means for removal or disposal should be noted and discussed with owners.

4. Note topography, soil profile and general characteristics of the materials to be handled. Discuss possible grade changes to improve conditions.

5. Check adequacy of the right-of-way and discuss any special agreements made with owners, locations of entrances, parcels not yet acquired, etc. The Project Engineer should obtain and study all R.O.W. agreements with property owners. These agreements can be obtained from the Division R.O.W. Engineer. If any action is required by the property owner to remove obstructions such as buildings, fences, etc., he/she should be notified in writing that the project is now under construction and the removals for which he/she is responsible, by R.O.W. agreement, should be performed as soon as possible.

6. Check need for detours not shown on the plans and arrangements for it. If there is a special order of construction required to accommodate traffic this feature should be checked.

Notes should be made on the office plans of any changes agreed upon and these changes should be submitted in proper form to the District and/or Division Construction Engineer for approval.

Inspectors should participate in the portion of this inspection affecting their duties.

1:2:E:1.4 Preliminary Inspection with Contractor.

Before construction work begins, if the Contractor requests it or if it seems desirable, the Project Engineer should arrange an inspection with the Contractor on the work. The Project Engineer should go over the entire project with him/her, pointing out any special conditions or characteristics of the work and explaining any features with which the Contractor may not already be familiar. The Project Engineer should point out and make sure that the method of marking stakes and the information on the stakes, station numbers, cuts or fills, offset, method of marking limits for clearing and grubbing, etc., are entirely clear to all concerned. At this time, the Contractor should also be made aware of advance construction warning signs and other devices, which must be in place prior to beginning work.

1:2:E:1.5 Field Engineering (Introduction & Staking Sequence)

The staking procedures outlined in this unit primarily relate to the use of a Transit and an Engineer's tape, which are still used by project personnel in many areas of the state. These staking procedures are also applicable and can be readily adapted to the use of a Total Station type instrument. In using the Total Station, the Theodolite and Electronic Distance Meter (EDM) features are used for measuring angles and distances in staking.

With the Total Station one also has the option to use the coordinate feature for staking in lieu of angles and distances. When using the coordinate procedure, care must be taken before beginning any staking procedure to assure that the Total Station is properly aligned with two points of known coordinates and also properly oriented to the azimuth that relates to previous staking operations. **Procedures for using Total Station Electronic Data Collection Equipment are shown in bold type for each of the applicable operations.**

The emphasis that this unit, places on the proper referencing of all staking operations is applicable to either the Transit or Total Station, only referenced in a different manner.

Laser Beam and other Automated leveling devices are now in use for the control of grades, particularly in the laying of drainage and construction of related type structures. These type devices are certainly acceptable so long as they are properly checked and the accuracy of the grade control is maintained and properly checked.

After securing from the Project Engineer a set of the plans and the field books of the location survey, the Chief of Party should organize his/her party and proceed at once with the construction survey work. The primary and secondary operations, in approximate order, will be:

*** (A) Re-running centerline, (or base line).**
*** (B) Re-running benchmark levels.**
*** (C) Re-running centerline profile.**
(D) Staking out right of way lines.
(E) Taking and plotting cross-sections.
(F) Marking clearing and grubbing limits.
**** (G) Setting slope stakes.**
**** (I) Staking Sewer Lines**
**** (J) Setting Grade Hubs**
**** (K) Setting Control Elevation Stakes**
(L) Final Excavation Cross Sections
**** (M) Staking out bridges.**

Note! <u>If engineering controls are included in the contract:</u>

* The Contractor assumes responsibility for these functions.
** The Contractor performs these functions.

Later on as construction progresses, alignment and reference points will be needed from time to time for batter boards and various stages of bridge construction. As portions of the graded earth surface are completed, grade hubs will be required. Cross sections will be taken for monthly and final estimates.

If sufficient survey personnel are available, it is advisable to begin staking right of way points and marking clearing and grubbing limits concurrently with the rerunning of the benchmark levels. It is desirable to have the right of way hubs in place when cross sections are taken, so the last shot at each

station can be taken on the right of way hub. This will insure that the final cross sections are taken exactly over the original, which is necessary for accurate work.

All field notes must be recorded in standard field and level books. They should be kept with the fact constantly in mind that they are permanent documentary records. Notes and figures should be neat and clear, and in sufficient detail to be understood by someone not familiar with the project. Too much detail is better than too little. Notes should never be crowded. Field books are cheap and there is no excuse for putting so many notes on a page that they may be misunderstood. When field engineering commences all field books should be plainly labeled for identification with the contents, route, and project number, station to station, name of Project Engineer and the year. All field books should be included when other project documentation is turned in at the end of the project.

Before the centerline is rerun, the plan survey data and control points should be carefully rechecked, curve data verified, and the new field book made up from the plan data, including control and reference points. In copying this data in the new field book, entry of stations should be spread out leaving plenty of room for showing extra reference points, correction of errors, equations, etc. The level book should be made up to show benchmark levels separate from profile or cross section work. Typical field notes are available for guidance of survey parties starting their first work of this nature. At the beginning of each day's notes, there should be listed the date, weather conditions and party personnel.

1:2:E:1.6 Re-running Centerline

The alignment must be rerun the same as that of the survey shown on the plans. No change in alignment or grade can be made without prior approval from higher authority through the District Engineer. However, previous errors of chaining or stationing should be corrected by equations, and any curve incorrectly run originally must be made to fit the established tangents. If possible, the Chief of Party and Instrument Person should look over at least a portion of the location before starting the line work, to observe the condition of old hubs and whether old reference points are still in place. Where the original survey was made some years earlier, and especially in cultivated or cultured areas, there may be trouble in finding hubs or reference points. In some cases it may be profitable to spend some time with an instrument and chain ahead of the line work, re-establishing these points so as to permit later line work to proceed without delay.

All control and reference points should be checked and re-staked if needed as the centerline is re-established. Once the Beginning of Project (B.0.P.) hub is found or reset, together with a P.0.T. ahead, the B.0.P. reference points should be re-checked, new guard stakes driven for them and new reference points established if needed, while the instrument is set up. This also should be done for each centerline tack point hub and reference points along the line as they are encountered throughout the project. Reference points, where practicable, should be located on, near, or beyond the right of way limits at points where they will be least likely to be disturbed. Each centerline control point hub should be referenced to at least two points and, if practicable, both the angle and the distance should be recorded. Reference point stakes and hubs shall be of a durable material placed at locations, which will not be disturbed. In open areas it may be necessary to drive long hubs with tack, or iron pins with chisel cross mark, as reference points. In such cases four such reference hubs should be established. Reference hubs should be marked by two guard stakes, which are driven to stable depths about eight inches from the hub at an angle of about 30 degrees from vertical. (Guard stakes shall be marked with paint & flagged.) Reference point data for reference points should be recorded in the field book.

After the B.0.P. is referenced and the instrument foresight checked on the P.0.T. ahead, or after checking and referencing all control points, centerline staking will begin. Centerline stakes will not require tacks. Lining within the width of the rod will be sufficiently accurate. However, the measurement must be extremely accurate, with the chain truly horizontal at all times, and plusses carefully checked to avoid errors in reading the chain. Stakes should have the station number and plus marked in large neat

numbers beginning an inch from the top of the stake. All stakes with plus figures should include the complete station number (thus 450+24.5, not +24.5). The reverse side of the stake is marked with the identifying symbol (℄, P.0.T., etc.); also the offset distance, if any, with the offset figure circled. Line stakes are driven plumb with the station number facing the B.0.P. Line stakes should be set on even 100-foot stations maximum, on even 50-foot or 25-foot stations if needed on curves, and at substantial breaks in the ground. Plus stations should be set not only for breaks along the centerline but also for breaks on one side of the centerline that would not show up in each of the two adjacent cross sections. In extremely rugged terrain, line stakes should be set at more frequent intervals to expedite later slope stake work.

In the process of rerunning the centerline, additional control points or tack hubs should be set at or near points where they will be needed for the layout of drainage structures or other work. A hub should be set at the intersecting centerline of each culvert if accessible, otherwise at convenient points on each side of the structure. Plusses and identifying symbol should be marked on the hub guard stake driven to the side of the hub. For bridges, carefully double checked hubs should be set some distance on each side of the structure location, but within easy sight of each other, and adequately referenced to points safely beyond construction limits or possible disturbance. These hubs should be of heavy material driven in a slight depression scooped out so that the top of the hub will be slightly below normal ground line and hence safe from disturbance. At intersecting roads, railroad, power lines, etc., hubs should be set for the purpose of checking the skew angle as well as for further use in structure layout.

The above instructions are for rerunning a routine centerline with no complications. In practice it may be necessary to run offset lines, to turn angles to avoid objects and in developed areas to resort to a variety of special procedures devised by the Chief of Party. These instructions serve as a uniform procedure for rerunning centerlines.

Total Station Electronic Data Collection Equipment.

Obtain from plans, or calculate coordinates for centerline control and R.O.W. points. Assign coordinate values for all centerline control and right-of-way points using data from plan bearings and distances from B.O.P. to E.O.P. Assign a unique number for each point set and maintain in electronic file and field book for the project. Run a control loop throughout the project tying it to as many centerline control points found in the field as possible. Any adjustment to the loop that may be necessary to make it compatible to centerline control may be made in the office. Once finalized, using control loop points, set durable reference monuments at or near the right-of-way line so that they will not be disturbed during clearing or grading operations. Set points should be double-checked to insure accuracy.

1:2:E:1.7 Re-running Benchmark Levels.

Benchmark elevations should be checked as soon as the centerline is established. Better work generally will result if checking benchmarks is an entirely separate operation from ordinary centerline profile work. Extreme accuracy in instrument adjustments, choice of turns, rod reading, etc., is essential. Only simple instrument adjustments should be attempted in the field. For complex adjustments, the instrument should be returned to the Division Office. Foresight and backsight distances should be balanced to the extent practicable. Generally, elevations are referenced to sea level datum. When checking benchmarks, readings should be taken carefully on any geodetic control station of other agencies that are encountered in the vicinity. For benchmarks on or near the project, obtain correct benchmark elevations from USGS.

The check levels are started from the first benchmark elevation, assuming it to be correct. The benchmark level notes should be kept in the usual standard form in a separate part of the level notebook from other levels. Backsights and foresights can then be added quickly in case of discrepancies in

elevations, to check numerical errors before repeating any leveling operations. Each benchmark should be used as a "turning point" and not merely checked by a single intermediate reading. At this point the elevation of all control points should be gathered and recorded.

It is advisable to establish additional benchmarks in the process of rechecking existing ones. Additional benchmarks should be established where the existing benchmarks are further apart than 1000 feet in ordinary terrain. They should be much closer than in rugged terrain and preferably near grade points. One benchmark should be established for each large culvert and bridge at a location convenient for structure level work. Sufficient readily available additional benchmarks set at this stage will facilitate future level work throughout the project. Benchmarks should be located outside of construction limits, preferably near or just inside the right of way line on objects that are firm and are not likely to be disturbed. Trees, tops of bridge piers and headwalls are typical good firm benchmarks. An accurate description of the benchmark, including the station number and offset, must be entered in the notebook, with a sketch if helpful. To expedite finding the benchmarks in the field, the letters "B.M." and the number (thus, B.M. No. 2) should be marked, preferably on a stake nailed above and pointing toward the B.M., or if necessary painted on the object with an arrow pointing to the B.M. The original guard stakes at old benchmarks should be replaced with new stakes and fresh markings.

After a reading on the last B.M. on the project, the level party should recheck the entire line of benchmarks from E.O.P. to B.O.P. If a discrepancy is found at any point the notebook should first be checked for numerical errors. If the figures are correct it will then be necessary to drop back to the last correct B.M. and run a third set of levels to see which of the previous two was in error. The level loop closure in feet should not exceed, plus or minus .04 times the square root of distance in miles ($\pm .04 \sqrt{}$ miles).

When using these benchmarks for construction level work, the level party should <u>always</u> complete their notes by tying back into the same or another benchmark as a check on the accuracy of their work.

Upon completion of a grading and drainage project and while benchmarks are still in place, it will be worthwhile to establish additional benchmarks on culvert headwalls and on each bridge. These should be fully described in the project field book for future use. When selecting benchmark locations take into account the area of construction, mowing, maintenance operations, etc. so that they will be in a practical place and not be disturbed.

Total Station Electronic Data Collection Equipment.

Note! Due to the expertise required the Total Station Electronic Data Collection Equipment should not be used to establish benchmarks. Rather, the use of conventional levels such as Self-Indexing or automatic levels will provide the degree of accuracy needed without the possibility of errors brought about due to the lack of expertise required to establish accurate elevations with Total Station Equipment. Elevations should be set on all control points for data collection.

1:2:E:1.8 <u>Re-running Centerline Profile Levels.</u>

The rerunning of the centerline levels is comparatively simple and hence is sometimes combined with the cross section level work. The matter of whether two operations should be combined depends sometimes on circumstances and sometimes on choice. Obviously more thorough work can be done with fewer chances of errors, and notes can be kept neater if the centerline profile is rerun as a separate operation. All readings for turns and readings on R.O.W. hubs and all B.M.'s should be to the nearest 0.01 foot. Readings for intermediate centerline stations and for cross sections should be to the nearest 0.1 foot. It should be remembered always that ridges, valleys, and other substantial breaks in the slope of the ground must have a centerline plus measurement from the previous station and a rod reading. This

may require inserting more centerline stakes at needed points, which were not placed when the centerline was staked. Constant alertness is required to catch all these breaks, as they often do not show up on the centerline but occur some distance to one side. Any such break that does not extend to the next cross section behind and ahead, requires a centerline reading and a cross section Needless to say, a reading or preferably a turning point on each B.M. should be taken as the centerline profile proceeds.

Total Station Electronic Data Collection Equipment.

Note! Due to the expertise required the Total Station Electronic Data Collection Equipment should not be used to establish benchmarks. Rather, the use of conventional levels such as Self-Indexing or automatic levels will provide the degree of accuracy needed without the possibility of errors brought about due to the lack of expertise required to establish accurate elevations with Total Station Equipment. Elevations should be set on all control points for data collection.

1:2:E:1.9 Staking out Right of Way lines.

As soon as the centerline has been re-established, the survey party should stake out the right of way lines. The R.O.W. map should be used instead of the plans since it is the legal document of record and sometimes there are differences between the plans and the R.O.W. map. The procedure for this work in developed areas will have to be adapted to existing conditions in each case and no uniform procedure can be set up. For normal rural conditions the best method of staking right of way is by running an offset line along the R.O.W. limits. In this method 90 degrees is turned from the centerline with the instrument set up over a convenient centerline hub, the right of way distance measured, and the right of way hub set. This step is repeated at a convenient centerline hub an appropriate number of stations ahead. Then with the instrument set over one of the control points and lined on the other, intermediate right of way hubs are lined in and measured with reasonable accuracy by stations.

This method works well on long tangents in open country but not so well in rugged terrain or heavily wooded areas. It is used on curves by means of appropriate computation for different degrees of curves, chord lengths, etc., on each side of the centerline. Sometimes it is convenient to work out tables of these special chord lengths in advance of such work. The alternative method is an instrument setup on centerline station with 90 degrees turned from centerline (or from tangent to the centerline curve) and the right of way distance measured at each station and staked. This method can be used to advantage in dense growth. The cleared line will remain open for later convenience in taking cross sections. The practice of turning 90 degrees off of the centerline, measuring out and staking R.O.W., and then turning 90 degrees back from a setup on the right of way hub without a foresight is not good. It usually results in having to move each stake to compensate for angle turning errors.

For intermediate right of way stakes, a hub with a guard stake behind it (but no tack) is ordinarily accurate enough. The guard stake should show the letters R.O.W., the distance from centerline, and the station number on the front. At the P.C. and P.T. of curve, P.O.T., and at all changes in right of way widths a right of way hub with tack should be set by the instrument turned 90 degrees off the centerline tangent and by accurate chain measurement. One control hub at each change in right of way width should generally be referenced and the references recorded in the field book. Right of way hubs set at grade points when cross sections are taken are also desirable.

For convenience in quickly locating station numbers, a large stake or board with the station number painted in large figures should be placed behind the R.O.W. hub ever 500 feet.

Total Station Electronic Data Collection Equipment.

Setting R.O.W. points with Total Station equipment begins by, setting the instrument on a control point with known coordinates then back sighting on a control point with a known coordinate. Obtain information from data collector and radially stake to coordinates of R.O.W. monuments. Set hub and tack with two offset reference points for each monument position. Record number and location of reference points in field book as well as electronically. Drive guard stakes to protect R.O.W. and reference points giving sufficient information for the monument to be set.

1:2:E:1.10 <u>Taking Cross Sections.</u>

To insure accuracy, the original and the final cross section at each 50-foot station must be taken one exactly above or below the other and at right angles to the centerline tangent. This will be easy, as the right of way stake already in place fixes the line and angle and it is only necessary to place a line rod behind the right of way stake so that the Tape person standing over the centerline stake can line in the level rod person for each reading on the cross section. A reading must be taken at each substantial break in the ground along the cross section, with the farthest reading always on the right of way hub (unless there is some special need for running the cross sections further). The cross section ground readings should be taken to the nearest 0.1 foot and those on the R.O.W. hub to the nearest 0.01 foot. Distance out from the centerline should be measured to the nearest foot. All cross section rod readings must be taken with a stationary instrument type level unless one or two more readings are needed near the end of the cross section. A hand level, held at one level, could make these. Making a "turn" with the hand level and using it as a second H.I. level must not be done. Each hand level reading must be recorded in the notebook followed by the identifying letters "H.I.". Only the Chief of Party or other experienced personnel should take hand level readings. Use of the hand level is not encouraged and should be confined to an occasional hard-to-reach shot. If several such points occur along consecutive stations, the stationary instrument type level should be used at a new H.I. as described below.

The choice of location for setting up the instrument for cross section work will depend on local conditions. The instrument person's good judgement, planning and experience will expedite the work. In relatively open flat terrain there should be no problem. The instrument can be set up within range of all needed readings on each cross section within 200 or 300 feet in each direction from the instrument. For flat heavily wooded areas, it may be necessary to set up the instrument near the centerline at each station. The undergrowth would have to be cleared each way to the right of way stake as needed for rod readings. For sharply sloping ground, the level should be set up so as to cover the lowest or the highest portion of a number of cross section stations. From that H.I. all the cross section rod readings within range for those stations should be recorded. Then a turn should be made to a higher or lower H.I. and additional cross section rod readings within range should be made for those same stations. This same process may have to be repeated with still another H.I. for portions of the same cross section. In using this method it is necessary, that the H.I.'s be numbered and each rod reading be designated H.I. No. 1, H.I. No. 2, etc. Time should not be wasted making a turn at every cross section station every time the rod goes out of range, where more than one station can be combined as noted above.

The cross section work should be tied into each benchmark as it is reached, as a check on the work. This should be done preferably by using the B.M. as a turn.

The work can be expedited by the level person's good judgement in choice of setups and choice of points for rod readings. He/she should be alert to call for a reading at every substantial change in the slope of the cross section, but he/she should also avoid readings at useless or unnecessary points that only add to the work without changing the picture of the cross section. The rod person's good judgement and experience at this stage will produce more accurate cross sections. One of the best methods of

developing these qualities is for the Chief of Party to arrange with the Project Engineer to have each rod person take turns plotting the cross sections from the rod reading points, which he/she selected.

After original cross-sectioning has been completed, the elevations taken are plotted on standard cross section paper usually on a scale of l" = l0' or l" = 5'**.** Using the plan profile grade and typical section, a roadway section (template) is plotted above or below the original cross section. The volume of material existing between the original section and the roadway section may be computed by planimetering the area at each station. **(See Total Station option for determining volumes at end of this section.)**

Cross sectioning of borrow or other material source areas should follow the same general procedure as for roadway cross sections. First a base line must be established with the instrument, preferably through the long axis of the source area with hubs at each end set outside construction limits and adequately referenced. Stations are measured and intermediate stakes lined in at maximum 50-foot intervals and closer in rough terrain. It is also essential in these areas that the original and final cross sections be taken one exactly above the other. Therefore, unless the area is extremely narrow, a parallel auxiliary base line should be established at an appropriate distance to one side, with stations at 90 degrees from those on the main base line for lining up the cross sections. If the area is unusually wide it may be convenient to run parallel main base lines instead of the auxiliary line, with cross section distances measured in each direction along each line. After the base line has been established, cross sections are taken and recorded as for the roadway. A benchmark should be established at a convenient safe point near the borrow area, with levels run from the nearest established B.M. This B.M. should be used for all level work in the borrow area. Each use should be checked by a final reading back on the B.M. before removing the instrument. As soon as all needed material has been taken from the area it should be dressed and final cross sections taken so that measurement and payment will not be made for material lost through erosion or used elsewhere.

Total Station Electronic Data Collection Equipment.

In lieu of cross sections the Total Station Electronic Data Collection Equipment is capable of creating Digital Terrain Models for comparison. A topographic survey is performed to obtain the original contour elevations. Begin only after all control points have been checked and elevations verified. Set instrument on control point with known coordinate then back sight control point with known coordinate. Begin collecting point and elevation data in an orderly fashion, noting the location and point number of the first shot. Shots should be taken as often and at locations as to provide an accurate representation of the actual field conditions. The rod person should have this in mind at all times. Accurate and detailed field notes and point coding shall be maintained at all times. Control points should be re-shot and positions verified as the data collection progresses. Data collection shall progress through the project methodically, making sure to cover all areas of the project. At the end of each day the location and point number of the last shot should be recorded in the field book. Data should be downloaded and checked as often as possible to avoid data loss and limit the amount of rework in the event mistakes are found. Following any changed condition a final topographical survey can be conducted over the same specific area and by an electronic layering comparison a volume of the difference of the two terrain models can be computed. This procedure will be the same for isolated areas such as borrow pits, stockpiles, excavations, and fills.

1:2:E:1.11 <u>Marking Clearing and Grubbing Limits.</u>

The clearing and grubbing limits are marked for the purpose of showing the Contractor the area, within which he/she must clear and grub, as distinguished from the remaining areas of the right of way where he/she must do selective clearing only and must protect other growth. If the project has been

re-cross sectioned, cross sections plotted and template laid, the approximate slope stake distances should be simply copied in the note book and then measured off at needed intervals in the field from the re-established centerline or from the R.O.W. hub. If the project has not been re-cross sectioned, the cross sections on the plans will generally be sufficiently accurate for this purpose. The clearing and grubbing limits should extend a few feet back of the slope stakes, and should be marked, usually by strips of brightly colored flagging tied or placed on bushes or trees or thoroughly painted. In open country wooden boards or stakes should be used and these should be long and narrow so that they cannot be mistaken for slope or right of way stakes. These need be set only at such intervals as will indicate clearly the required limits. These clearing and grubbing limit marks should be set and the clearing and grubbing generally should be done before the slope stakes are set.

1:2:E:1.12 Setting Slope Stakes

There are two general methods of setting slope stakes, (1) measuring out from the centerline, or (2) measuring back from the R.O.W. hub.

In the first and simplest method, the notebook is made up to show the slope stake distance (the distance from centerline out to the point where the cross section template line intersects the ground line) and the cut from that point to the bottom of the ditch or the fill from that point to the top of the graded earthwork. These are taken from the cross sections. The template slope ratio is also shown. The other data, width of side ditch, front and back slopes, crown and shoulder elevations, are shown on the plans and (where uniform) need not be in the notebook. With the field book data listed above, finding the slope stake point becomes a process of trial measurement and adjustment as follows: After the level is turned off the nearest B.M., the slope stake distance in the notebook is measured from the centerline and rod reading taken at that point. If the cross section work were perfect the rod reading would show the same cut or fill as listed in the notebook and that point would be designated as the slope stake point. More often the actual cut or fill from the rod reading will differ from that tabulated in the notebook. In that event the rod person moves the rod toward or away from the centerline the amount estimated by the Chief of Party and a new rod reading and new measurement from centerline taken. This step may have to be repeated. Finally the Chief of Party, from the rod reading, the distance out, the template elevation, and the slope ratio, finds the point where the cut or fill slope will intersect the actual ground surface, marks it as the slope stake point and corrects the distance out and the cut or fill in the notebook accordingly. The slope stake is then set and marked with the cut or fill to the nearest tenth (thus C-14.8) with the slope ratio below it (thus 2.5:1). On the back of the stake is marked the station and (if offset) the offset distance. The responsibility is then assigned to the Contractor to preserve both the slope stake and the slope stake point.

In the second method, which is in more general use, the notebook is made up to show the slope stake distance from the R.O.W. hub, the cut from slope stake point to bottom of side ditch or the fill from slope stake point to top of graded earthwork, and the slope ratio, as in the first method. In addition the notebook should show the cut and distance from R.O.W. hub to bottom of side ditch or fill and distance from R.O.W. hub to top of earthwork and the slope ratios; the width of side ditch; front slope ratio and distance to graded earth shoulder point; and cut or fill from *hub* to shoulder point and centerline. If improved roadbed is required, these figures should be to the <u>bottom</u> of the improved roadbed. If subbase but not improved roadbed is called for on plans or found necessary at this stage, these figures are adjusted to the bottom of the subbase. All of this data is taken from the plotted cross section and template and all subgrade elevations for each station, which have previously been placed in a field book during preliminary office work. With the field book thus prepared, the slope stake point is found by trial as in the first method, but by measuring out from the R.O.W. hub and taking rod readings based on the hub elevation. A hand level may be used in this work for short distances, but should not be used for more than one "turn". When the slope stake point is found, the slope stake is set there, marked the same as in the first method. All other grades of the roadway cross section can be established from the slope stake utilizing elevations shown in the grade book. In either method there must be complete understanding by

all parties as to (1) where the offset distance is measured from and (2) from what point the cut or fill is measured. It is the Project Engineer's responsibility to see that this is made clear.

For channel changes of substantial cross section areas, slope stakes should be set in the same manner as roadway slope stakes, after the centerline of the channel change has been established. These stakes should show cut to the bottom of the channel, side slope ratio, and stationing. For channel changes of small dimensions, such as outlet ditches for pipe culverts, a single line of stakes along the centerline of the ditch marked with the cut and the size of the ditch will suffice.

1:2:E:1.13 <u>Staking Out Small Drainage Structures.</u>

The Chief of Party will enter into the Drainage field book a sketch of the structure showing the station number, size, type of pipe or culvert, skew, inlet flow line elevation, outlet flow line elevation and distance from the centerline to the inlet end and to the outlet end. Only one structure should be shown on one page. This data is made up from the plans after any changes in location or length has been made as a result of the preliminary field inspection or roadway cross section corrections. (Structures should be adjusted to fit existing conditions at the time of this initial staking). These distances from the centerline can be readily rechecked from the cut or fill and the slope ratios, taking into consideration the skew angle.

A centerline tack hub at the centerline of the structure was set when the centerline of the project was rerun. From a setup on this hub the instrument person turns the structure skew angle. The distances (taken from field book) to the inlet and outlet ends of the structure are measured and tack hubs set at those points. Also tack hubs are set 10 feet (or some convenient working distance) beyond each end hub and two additional hubs beyond each end a safe distance to serve as reference hubs. The instrument is then set over each structure end hub and tack hubs set on line with the outer face of each headwall a working distance beyond construction, usually 10 feet in each direction, and two additional reference hubs at safe distances beyond the 10-foot hubs. The 10-foot hubs are for the Contractor's convenience in stretching a cord to line up his/her forms and the more distant reference hubs are necessary in case the working hub is damaged. All these are tack hubs. The level is then turned off of the nearest benchmark, a profile taken along the centerline of the structure for computing excavation, and rod readings taken on each of the four centerline hubs at the ends and 10 feet beyond. Cut or fill from hub to flow line is computed, using the flow line grade (extended) for cut or fill at the 10-foot offset reference stakes. The cut or fill from the hub to flow line (or invert) is marked on the face of each guard stake (thus C-2.5 Inlet Inv.). On the back of the stake is marked the size of the structure. Also the offset distance (circled) is marked on the offset stake. A check profile usually 300 feet, of the channel above and below the structure should be made to determine that the flowline elevation set would best fit the existing channel conditions. If it is revealed that either end or the entire structure is at the wrong elevation for proper drainage, it should be changed at this point. Generally such change will not affect the length of the structure. The level should then be turned back on the benchmark. All level notes, cuts and fills, etc. should be recorded in the structure book. This procedure is for pipe structures of 48 inches or less in diameter. Before an installed pipe is backfilled, the survey party must measure its actual length and record it on the same page as the layout data.

For pipe structures larger than 48 inches in diameter and for all box culverts, the procedure will be the same except that cross sections are required instead of a profile for excavation computations.

For side drains (not storm sewers) the procedure can be simplified in that a skew angle is not involved, and no profile is needed since no separate payment is made for excavation. The side drain should generally parallel the roadbed centerline and, in a flat bottom side ditch, should be located along the centerline of the ditch.

Total Station Electronic Data Collection Equipment.

Setting required control points for drainage structures begins by setting up instrument on the centerline Control point placed for the structure when the original centerline control points were installed. From setup on this centerline reference point the instrument person, utilizing pre-determined coordinates, sets centerline control points for ends of structure, offset working points, and offset reference points all of which are tack hubs. Level work in accordance with above procedures is then performed for proper control and placement of the structure.

1:2:E:1.14 <u>Staking Sewer Lines.</u>

The alignment notes, including manhole locations, etc., are taken from the plans and copied in the field book in standard form. With this information an offset line is run, usually about 10 feet from the centerline of the sewer on the side on which the excavated material will not be placed. Tack hubs are set on line at 25 or 50 foot intervals as needed, and at all manholes and inlet offsets. Manholes, etc., at angles on the line may require two offset hubs. A profile along the centerline of the sewer is then taken (reading to tenths). This is for computing excavation on storm sewers and for determining the depth of pipe for sanitary sewers. A set of readings on the offset hubs is taken (reading to hundredths). The cut, to hundredths, from hub to invert of sewer pipe is then computed for each station and marked on the guard stake along with the station number and offset. Manholes and inlets are marked appropriately on the guard stakes. From this layout the Contractor can measure over and excavate, then set batter boards for line and grade from the hubs for use in laying pipe. The inspector should make appropriate spot checks of the batter board elevations set by the Contractor.

A batter board is constructed by the Contractor. After excavation has reached the proper stage, a 2 x 4 stake is driven firmly on each side of the trench a safe distance (perhaps about three feet) from the edge, extending about two feet above ground. For bridge batter boards the level person, having turned off from the B.M., takes a reading on the ground at the batter board to find a convenient even foot above grade at which to set the board. He/she then directs the rod person to slide the rod up or down along each 2 x 4 until a point is reached an even number of feet above the required grade and this point is marked with horizontal line on each 2 x 4. The Contractor then nails a straight board across the trench with its top even with these marks. It is a good idea to check the batter board after it is nailed in place to make sure that nothing has slipped. The board is then marked to show the number of feet required above grade, the level person turns back to recheck on the B.M. after having recorded all these notes in the level book. The instrument is then set on the proper reference hub, lined to the other hub, and a point lined on top of the batter board for a nail. This process is repeated for other batter boards as needed. A cord stretched between the nails is on proper line and on an even number of feet above grade. The cord then is suitable for use in fine grading, setting forms, laying pipe, etc. **The use of a laser level is an alternate to this procedure.**

For sewers, with batter board stakes opposite each of the offset tack hubs, the line and even number of feet above elevation can be measured over and up from the tack hub using a carpenter's level. This work is usually done by the Contractor and checked on the batter board by the survey party. With all batter boards the same number of feet above grade the cord should show a straight line and straight grade, so that any errors are obvious. The line can be set up or down a foot as needed to stay within convenient limits necessitating two boards at that station with the number of feet above grade marked on each board. Unless otherwise instructed the required grade is always the invert or flow line of the pipe.

Total Station Electronic Data Collection Equipment.

Using information taken from the plans coordinates are calculated for location and alignment of sewer lines as well as the locations of manholes, jct. Boxes, etc. Working from two known

control points the limits, alignment and minor structure locations of the sewer line are staked. Following the procedures above the excavation limits and invert grades are determined.

1:2:E:1.15 <u>Setting Grade Hubs.</u>

For a grading and drainage project the last grade stakes that the Contractor normally will need will be "Grade hubs". Grade hubs (commonly called Blue-Tops) are driven so that the top of the hub, colored with blue keel and protected with a guard stake, is at the required elevation of the finished graded subgrade.

For a two-lane roadbed, setting grade hubs is a simple process. The centerline alignment of the roadbed is first rerun and centerline stakes (but not hubs) are set on each 50-foot station. Instrument notes from the previous rerun of the centerline are already in the field book for this operation. Next, the tape person and ax person measure from the centerline stake to each edge of pavement point, and the grade hub is driven lightly in place, using the right of way stake or some other guide to make sure that the grade hubs are at right angles to the centerline stakes. A grade hub is also needed on centerline. If the shoulders are 10 feet or wider, or on a special slope, another grade hub should be set at the outside edge of the shoulder. Next comes the level party. The grade hub elevations have already been figured and tabulated in the level notebook and the procedure at each station is simply to subtract the required elevation from the H.I. to get the rod reading, taking a reading on top of the hub, and directing the ax person how much further to drive the hub. This will require two or three trial rod readings and some skill by the ax person to avoid driving the hub too far. If the ground surface is somewhat above grade, it should be scooped out to permit driving the grade hub to grade. If the ground surface is too high or too low for the use of a grade hub, a stake is driven firmly, and then by sliding the rod down the stake, a point is found and marked, which is an even number of feet above or below the required grade. The standard form of this mark is a horizontal line across the stake with a crow's foot or arrowhead underneath pointing to the mark. The cut or fill from the mark is then written on the stake.

For a four-lane, divided highway, it will be necessary to rerun and stake the centerline of each two-lane roadbed separately before measuring out for grade hubs. On curves, if the original centerline was run in the median the centerline of the outside roadbed must be laid out with chords longer than 100 feet, and the inside roadbed with chords shorter than 100 feet, so that the grade hubs will be exactly opposite the original centerline stationing. These chord lengths probably have already been used and the field notes already made up in connection with earlier operations. Grade hubs can easily be lined up accurately at right angles by means of the stakes in the other roadbed. The procedure for grade hub staking will be the same as for two-lane roadbed.

Grade hubs, no matter how they are offset, are in an exposed position and it can be expected that one will be lost occasionally. On the other hand the Project Engineer should impress on the Contractor that these grade hubs must be protected in fine grading operations and that resetting will be limited. The practice of knocking out grade hubs, requiring a new set to be rerun for the next blading operation, should be stopped. Three or four sets of grade hubs on the same location are not necessary and should not be set. Such procedure not only burdens the survey party but also gives the Contractor an opportunity to claim that grade hubs were reset at a different elevation causing him/her additional work.

For curb and gutter, the procedure for setting line and grade must be varied to fit each situation. Generally tack hubs offset outside the curb line can establish the back-of-curb line. If this offset distance can be the same for the entire project, chances of error will be reduced. Profiles can be taken on the hubs and the cut or fill to the top of the curb marked on the hub guard stake, along with the offset distance and the station number. At street intersections a tack hub should be set at the center point of the radius of the circular curb return, if practicable; otherwise a tack hub must be offset from each end of the curved curb section.

1:2:E:1.16 Setting Control Elevation Stakes.

The first survey work in the base and paving stage of the contract will be setting control elevation stakes after re-establishing the centerline of the pavement (or each pavement if lanes are divided). The location of these stakes will depend on project conditions. A safe location may be on the shoulder points or in the median. Since the Contractor is directly responsible for the protection and preservation of this one set of stakes throughout all construction stages, he/she should be consulted and the location decided upon after due consideration of his/her plans and suggestions. Hub stakes should be of substantial size and of sufficient length to resist displacement. Levels must be very carefully taken to the nearest one hundredth and tied into each benchmark. The offset from the tack and the cut or fill from the top of the hub (to the nearest one hundredth) should be marked on the guard stake, along with the station number. The Contractor, for his/her own protection, may elect to set posts as a further guard for the hub. All notes must be recorded in standard form in the field books. This work must be done with the fact in mind that each control elevation stake is to serve as a reference hub and a benchmark for that station for the remainder of the project. This procedure has been established to save rerunning separate lines of levels at each subbase, base, and pavement stage, but also to prevent claims by Contractors that errors were being made in setting a series of grade stakes at the same point.

As provided in the specifications, it is the Contractor's responsibility to obtain from this one set of control elevation stakes the line and elevation for each layer of subbase, base and pavement. If the Project Engineer and Chief of Party desire to assist the Contractor in transferring these lines and grades from the control elevation stakes to the work, it should be done only after definite agreement and understanding has been reached with the Contractor that the responsibility is his/her for the correct elevation of the finished work. The accuracy of the Contractor's work of taking line and grade from these control stakes will be checked as needed.

1:2:E:1.17 Final Excavation Cross Sections.

Final roadway grading cross sections should be taken on each 50-foot station as quickly as the slopes, ditches, etc., have been dressed to permit accurate survey work. Where improved roadbed material is to be placed, final excavation cross sections should be taken on sub-subgrade. The Contractor without additional compensation must repair subsequent washes from ordinary erosion and as a general rule is not cross sectioned. Additional cross sections will be taken to cover payment for slide repair. Undercut areas, muck and stripping of topsoil under fill areas must be cross sectioned before being backfilled and the Project Engineer must plan the survey work so that the survey party will be available for such work as needed to avoid delay to the Contractor. Final cross sections in material sources or pits should be taken as soon as the needed material has been removed, the pit dressed, and before erosion can damage the shape of the excavated area. Should it later become necessary to return to the material source for use at another location, the first set of final cross sections will permit computing separately the amount used at each location.

Total Station Electronic Data Collection Equipment.

Refer to the above procedures and procedural comments under “Taking Cross Sections” using Total Station Equipment for final Topographical survey and Digital Terrain Model comparison for computing volume.

1:2:E:1.18 Staking out Bridges.

The following procedure is for laying out a standard bridge on tangent with all points accessible. A tack hub has already been set on each side of the bridge location when the location centerline was rerun.

With the instrument now set on one of these hubs and the alignment fixed from the other hub, the beginning point of the bridge on centerline is measured from the nearest station and established by a tack hub. This beginning point is usually the back, or roadway face of the abutment (at the top of the abutment if it is battered). The guard stake for this hub should be plainly marked "beginning of bridge" so that it will be clear to all, including the Contractor, that it is the beginning point of the bridge as shown on the plans and not the centerline of a line of piles or other work. The bridge length should then be carefully measured, with a tack hub lined and set and the guard stakes marked "end of bridge." The distances to the centerline or working line of each pier are then measured and tack hubs lined in on the centerline or working line of each pier and guard stakes marked clearly "℄ of pier" or working line. Note the centerline or working line of each pier is staked, as contrasted to the back face of each abutment. While the instrument is set up and accurately lined, two additional tack hubs for reference should be set on the survey line. These hubs should be of heavy material of adequate length to resist displacement, or long iron pins with the tack point marked with a chiseled cross in the top. The hubs should be driven in a depression scooped out below the ground surface so that the top of the hub, flush with the depression, will be some three inches below normal ground level. For protection, these hubs should be enclosed in substantial board pens of sufficient size to permit an instrument setup inside. These same precautions should be taken with each one of the base line hubs.

The instrument is then set up on the centerline hub at beginning of bridge and the skew angle of the bridge turned. A tack hub is then set on that line just beyond wing wall construction limits for the convenience of the Contractor. A good location is then selected for a base line parallel to the location centerline and well outside construction activities, preferably near the right-of-way limits and a base line tack hub is measured from the centerline hub and set. On this same line a third tack hub is set some distance away at a point safe from disturbance, which may be some distance beyond the right-of-way if such a point can be found. Guard stakes for all these hubs should be well marked to identify the hubs clearly.

This process is repeated for the other side of the abutment, establishing a base line hub on that side also if there is a feasible location for a base line. This process is then repeated for the abutment at the end of the bridge. The process is then repeated for the centerline or working line of each pier. There should be at least two good reference hubs on each side of each pier and abutment in addition to the hubs set close in for the Contractor's convenience. The need for two reference hubs on each side and two beyond each end of the bridge will become apparent when the pier forms are extended too high for a foresight on the other side of the structure.

The instrument is then set over the abutment base line hub, lined on the base line hub of the other abutment and the intermediate hubs checked for alignment and distances along the base line. While the instrument is set over the base line hub it would be well to turn the skew angle between the base line and the back face of the abutment as a check on measurement and angles.

Needless to say each of these operations must be recorded in the field notebook with distances, angles, description of reference hubs so that they can be readily located, sketches as needed, etc., together with date, names of party and other pertinent information.

In laying out a bridge it must be impressed on the standard roadway survey party that much greater precision and accuracy is required than for routine roadway work. All measurements must be made with the chain horizontal and taut, and double-checked. Angles should be turned and then checked by the three-turn cumulative method. The complete bridge layout should be double-checked by completely different survey party personnel.

As a matter of cooperation with the Contractor, the Chief of Party should be prepared to figure the starting point of battered piles and to set guide stakes, to turn off difficult wing wall angles, and to perform similar minor services from time to time as the work progresses. These services will consist partly of

projecting pier centerline points into the excavated location and onto the pier forms at various stages, establishing elevation on batter boards set by the Contractor and on the forms as needed, etc. The survey party should be prepared to do this work promptly whenever requested by the Contractor. Also it should be made clear to all parties exactly what each of these intermediate points or elevations means.

After completion of the instrument layout, and before any excavation work is started, sufficient cross section levels must be taken at each pier and abutment for computing excavation quantities. The construction limits of structure excavation for measurement and pay purposes are specified in Section 215 of the Standard Specifications. After completing the cross section work, the work should be rechecked by turning back on the benchmark. After these cross section levels have been taken and properly recorded in the level notebook, the level work on bridges will consist of turning off from the nearby benchmark which was previously established, and giving elevations for excavation work, footings and various other points as construction progresses. These elevations are often given by means of batter boards set by the Contractor's forces for the level party. After completing any operations of this kind the level should always be turned and checked back on the benchmark. Level notes in standard form should always be kept in the field level book for each such operation.

For laying out a bridge on a curve, the plans will show the necessary dimensions already computed. They will show (1) the long chord equivalent length for the total bridge length, (2) the equivalent span length along the long chord for each span, (3) the offset distance radially from the long chord to the center point of each pier, (4) the length along the curve for each span, and (5) all needed angles if on a skew. With this data, the station plus of the beginning of the bridge is first measured and established on the curve. The long chord distance is then measured to intersection with arc of the curve and the end of the bridge established. The equivalent span length of each span is then measured along the long chord, and tack hubs set. While the instrument is set on the long chord alignment, two good safe reference tack hubs should be set well beyond each end of the bridge on the long chord alignment the same as for bridges on tangent. Next, using the offset distances from the long chord and the length of spans along the curve, the actual center point of each pier should be established by tack hub. Then with the instrument set on the actual center point of each pier and the back of each abutment, two good reference tack hubs and a working tack hub for the Contractor should be set on each side of each pier and abutment in the same manner as those for bridges on tangent, except that these reference hubs must be set radially, that is, perpendicular to a tangent to the curve at the center point of the pier or back of abutment. Usually a layout sheet will be contained in the construction plans as a guide for proper staking procedure.

The above instructions are to set up a standard procedure for laying out simple bridges by a field party accustomed to normal roadway work. No standard procedure can be set up for large bridges with inaccessible piers, dual bridges on curves of different degrees, triangulation problems, etc. Detailed instructions for such a variety of works are beyond the scope of this manual, and such work should be assigned only to skilled survey parties especially experienced in bridge layouts.

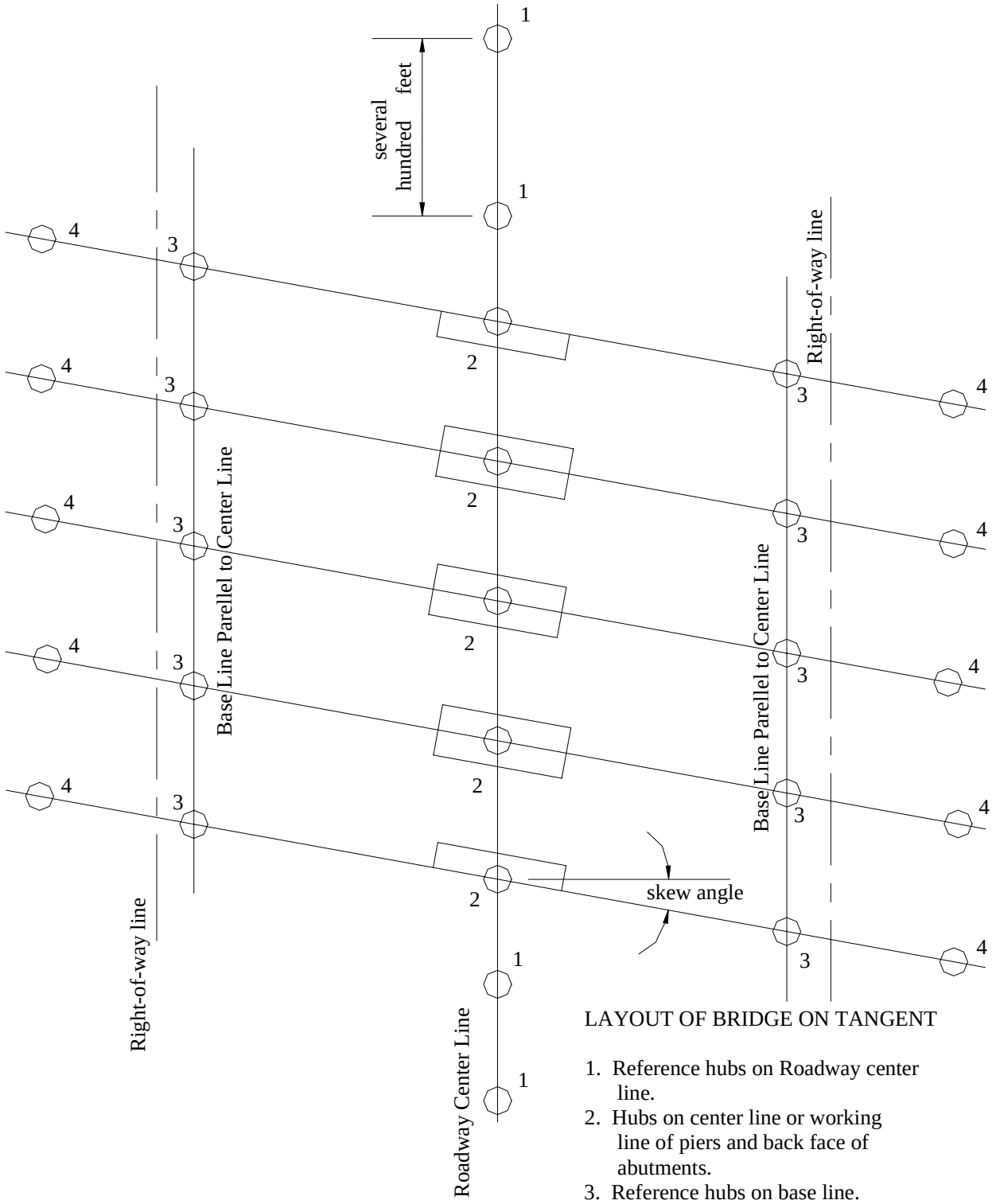
A stream water-level gauge is a definite necessity at every bridge site. The survey party should establish this gauge at the time they lay out the structure. The gauge may be a board of adequate length with painted graduations in feet and tenths, nailed to a convenient tree; or an old level rod may be used if the markings are plain enough to be read. The zero mark on the gauge is usually set at the low-water elevation. This elevation is then tied into the datum elevations used on the project and recorded in the survey notebook, so that the correct elevation of any high water can be quickly determined from the gauge.

A gauge reading should then be made and entered in the diary each day, beginning with the day the work order is issued. If the stream is subject to rapid rise and fall, two readings should be made and recorded on those days on which wide variation in water level occurs. This data will be of primary value in

determining working days to be charged. It may become important in event of a claim by the Contractor for time extension. It may be of future value in the design of structures at other crossings of the stream.

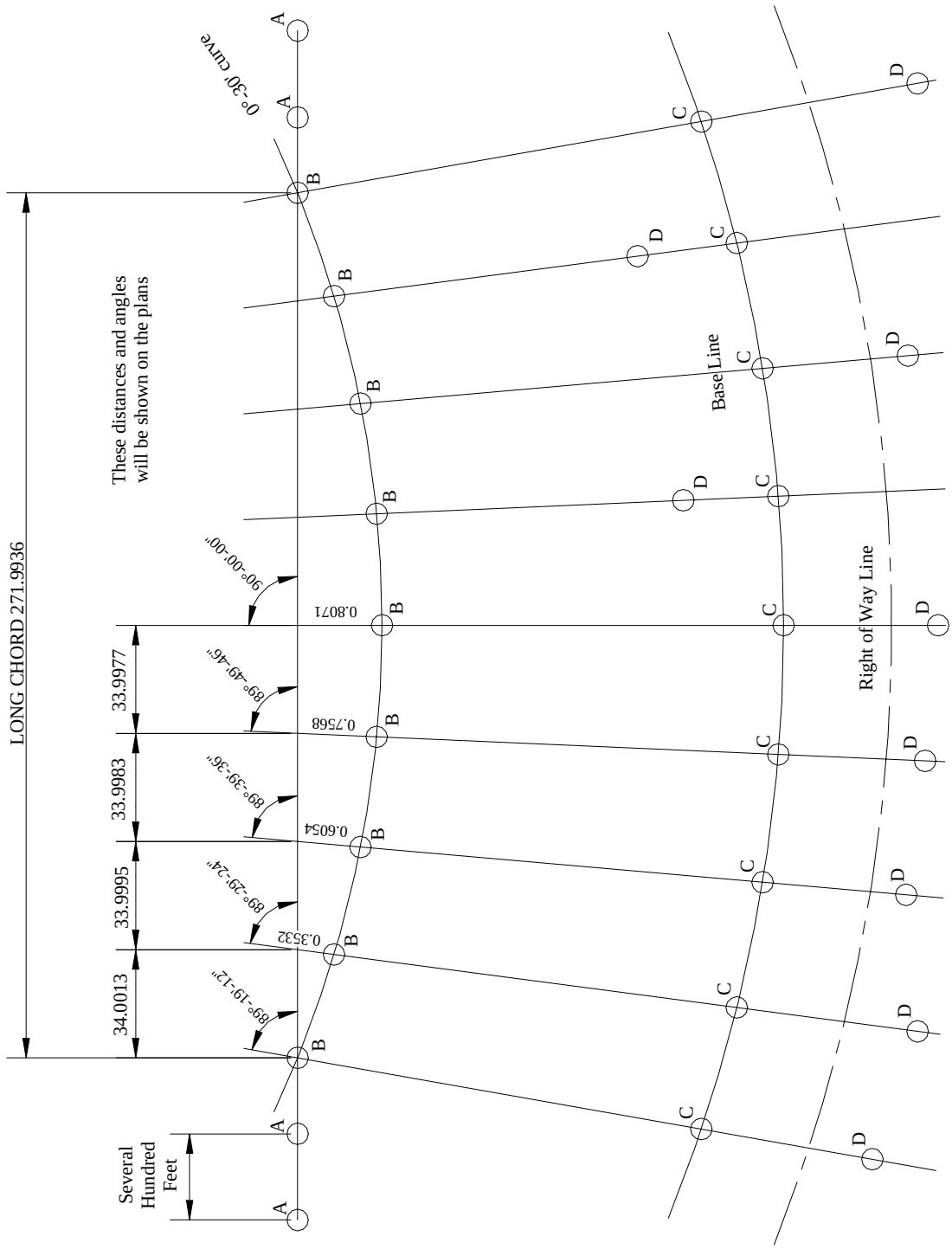
Total Station Electronic Data Collection Equipment.

Staking bridge structures with Total Station Equipment begins by setting up and back sighting instrument on control points with known coordinates. With predetermined data, stake two centerline reference hubs each side of structure, stake hubs on centerline or working line of piers and back face of abutments. Next, establish offset parallel base lines each side of structure and stake reference hubs. Utilizing base line reference points stake additional reference hubs on each side of structure. For the staking of bridge structures on curves, utilizing predetermined coordinates, refer to above procedures as well as illustrations included in this manual.



LAYOUT OF BRIDGE ON TANGENT

1. Reference hubs on Roadway center line.
2. Hubs on center line or working line of piers and back face of abutments.
3. Reference hubs on base line.
4. Additional reference hubs on each side of structure.



LAYOUT OF BRIDGE ON CURVE

A. Reference hubs for long chord.
B. Hubs on center line or working line of piers and back face of abutments.
C. Radial reference hubs on base line.
D. Additional radial reference hubs. (Repeat C and D on inside of curve)

1:2:E:1.20 FIELD ENGINEERING (BASIC SURVEYING OPERATIONS AND TYPICAL FIELD NOTES

1:2:E:1.21 LEVELING

Definitions of some leveling terms:

Elevation – the vertical distance from a datum, usually mean sea level, to a point or object.

Bench Mark – A relatively permanent material object, natural or artificial, bearing a marked point whose elevation above or below a datum is known or assumed.

Leveling – The process of finding the difference in elevation between two points by measuring the vertical distance between the level surfaces.

To determine the elevation of a point, we commonly use what is called **Differential Leveling**. In most of our leveling we use the self-indexing or automatic level.

Theory of Leveling

To begin the process of leveling we come off of a known elevation or an assumed elevation. During leveling operations, we always sight along a horizontal line. After leveling the instrument, a plus (+) sight or back sight (B. S.) is taken on the object of known or assumed elevation. This back sight or plus (+) sight is then added to the known or assumed elevation to give us the Height of Instrument or H. I. The Height of Instrument is the vertical distance from the datum to the horizontal line of sight of the instrument. A foresight (F. S.) or minus (-) sight is then taken on the rod placed on the point of unknown elevation. By subtracting this sight from the Height of Instrument (H. I.) we obtain the unknown elevation. By repeating this process through a series of Turning Points (T. P.), we can progress our leveling to obtain the elevation of several points.

In order to obtain the elevation of numerous points, we use a simplified method of note keeping.

Profile Leveling Notes

Sta.	B. S.	H. I.	F. S.	Elev.	
B. M.	6.10	106.10		100.00	
TP # 1	7.20	109.20	4.10	102.00	
5+00			1.20		
6+00			2.50		
TP # 2	4.00	110.00	3.20	106.00	
B. M.			3.00	107.00	106.99

Cross - Section Notes:

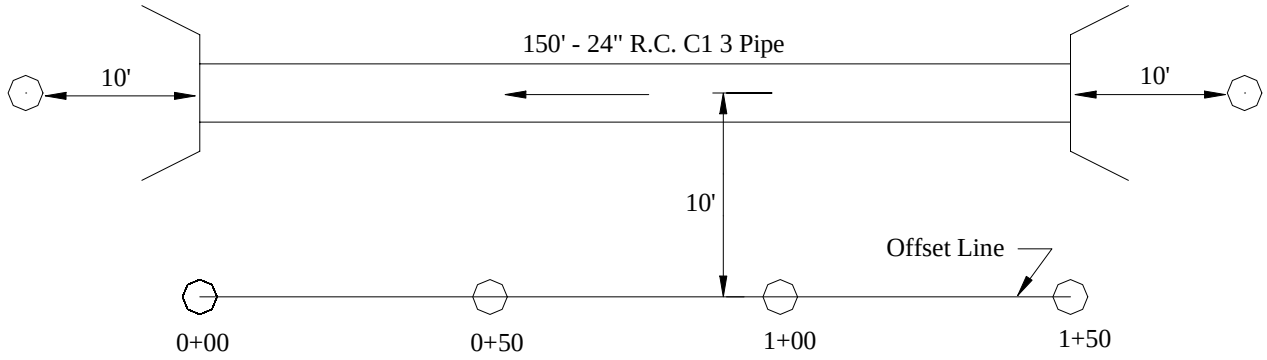
Sta.	B.S.	H. I.	F.S.	Elev.				℄		
B. M	3.00	103.00		100.00						
1+00			4.00		6.1	3.1	2.1	3.0	3.6	7.0
					60	20	10	10	35	60
TP # 1	5.00	106.00	2.00	101.00						
2+00			3.00		7.0	6.5	2.0	4.0	3.0	1.0
					55	25	10	10	35	60
3+00			3.00		6.9	5.6	4.0	4.0	5.1	6.1
					60	45	10	10	40	60

In profile leveling, we attempt to show the variations in elevation along the centerline. In cross sectioning, we attempt to show these variations perpendicular to the centerline.

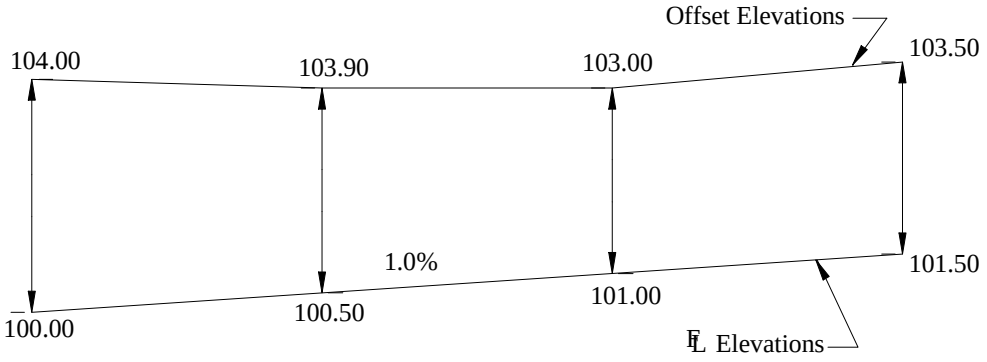
Pipe Staking

Sta.	B. S.	H. I.	F. S.	Elev.	Offset Dist.	Offset F. S.	Offset Elev.	F/L Elev.	Cut
B. M.	5.00	105.00		100.00					
0+00					10'	1.00	104.00	100.00	4.00
0+50					10'	1.10	103.90	100.50	3.40
1+00					10'	2.00	103.00	101.00	2.00
1+50					10'	1.50	103.50	101.50	2.00

Sketch Describing Above Notes:



Plan



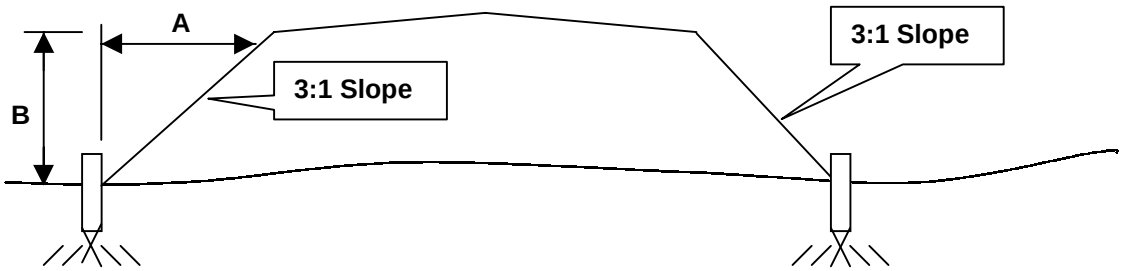
Elevation

Grade Hub (Blue-Topping) Notes

Sta.	(+)	H. I.	(-)	Elev.	
B. M.	4.00	104.00		100.00	
1+00					
Dist. From C/L	22	12	C/L	12	22
Elev.	101.00	101.50	101.80	101.50	101.00
Rod Reading Required	3.00	2.50	2.20	2.50	3.00
Actual Reading	2.80	2.20	2.00	2.40	3.10
2+00					
Distance from C/L	22	12	C/L	12	22
Elev.	101.50	102.00	102.30	102.00	101.50
Rod Reading Required	2.50	2.00	1.70	2.00	2.50
Actual Reading	2.45	1.95	1.68	2.03	2.45
TP # 1	7.00	109.00	2.00	102.00	
3+00					
Distance from C/L	22	12	C/L	12	22
Elev.	102.00	102.50	102.80	102.50	102.00
Rod Reading Required	7.00	6.50	6.20	6.50	7.00
Actual Reading	7.10	6.40	6.30	6.50	7.10

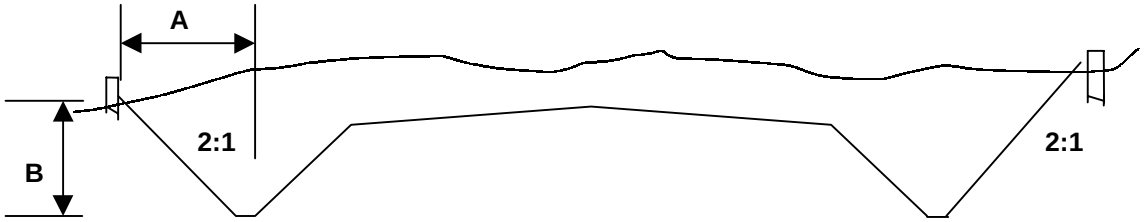
Slope Stakes

Fill Section



For a fill section, the slope stake must be set at a point where the horizontal distance, A, is equal to the vertical distance, B, multiplied by the horizontal magnitude of the slope. This point can only be found by trial and error.

Cut Section

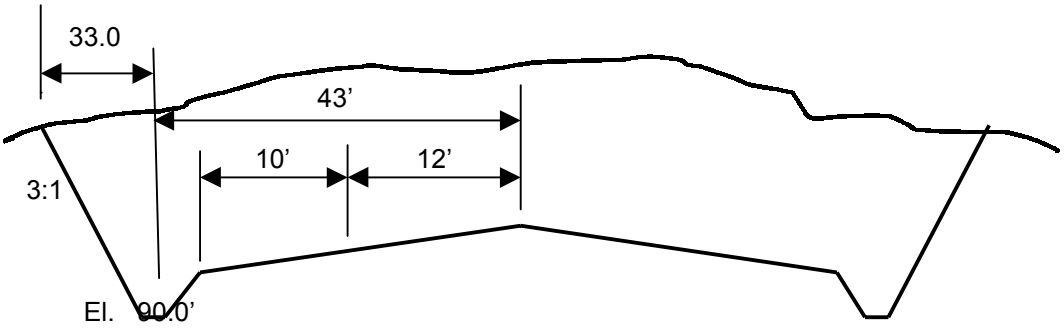


For a cut section, the slope stake must be set at a point where the horizontal distance, A, is equal to the vertical distance, B, multiplied by the horizontal magnitude of the slope. Trial and error must also be used to establish this point.

Notes For Slope Staking

Sta.	B.S.	H.I.	F.S.	Elev.	Ditch or Shldr. Elev.	Dist. from CL to B. Ditch or Shldr.	B.S.	F.S.
B.M.	5.00	105.00		100.00				
1+00	1	2			90.0	43'	3:1	
	105.00 - 5.00 100.00 - 90.00 10.00 x 3 30.00 75	105.00 - 4.00 101.00 -90.00 11.00 x 3 33.00 76		C-11.0 33.0 3:1 Distance	being held	on tape		

Sketch Describing Above Notes:



Proficiency in setting slope stakes can only be obtained through experience.

Signals For Leveling

Plumb Rod – If the rod is to the right of a plumb position, extend right arm full length upward and inclined to the vertical. Maintain this position until the rod is plumb. Vice versa for opposite plumb.

Give a T. P. – Hold one arm straight up and move it in a horizontal circle.

High Rod – Extend both arms horizontally and sideways, palms up, and bring them together overhead.

Raise For Red – Hold one arm straight forward, palm up, and raise arm slowly to a position about 45 degrees above the horizontal.

To Indicate a T. P. or B. M. – Rod person holds the rod horizontally above his/her head then places it on the T. P. or B. M.

Suggestions For Note Keeping

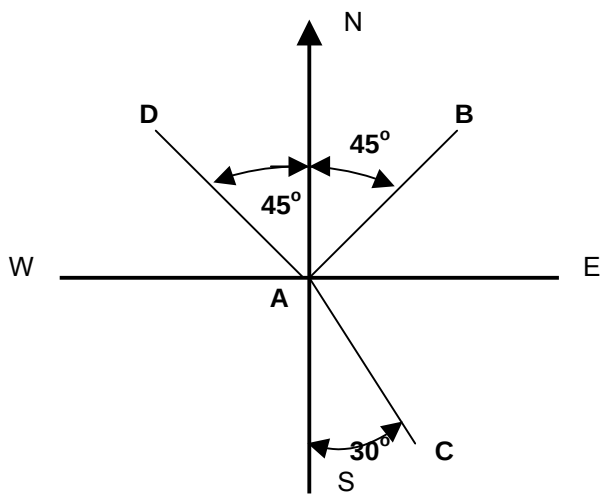
1. Use a hard pencil (3-H or 4 H)
2. Record directly in the field book and not from a piece of scratch paper.
3. Do not erase. Run a single line through incorrect data.
4. Carry a straight edge for ruling lines and a small protractor to lay off lines.
5. Use sketches for clarity and exaggerate details on the sketch.
6. Use explanatory notes when they are pertinent.
7. Repeat aloud values given for recording.
8. Place a zero before the decimal point for numbers less than one.
9. Record date, weather, name and duties of each party member for each day's work.

1:2:E:1.22 Transit/Theodolite/Total Station

B. Transit/Theodolite/Total Station (Angles, Bearing, Azimuth).

Bearing – The bearing of a line is the acute (less than 90°) horizontal angle between the meridian and the line.

Meridian



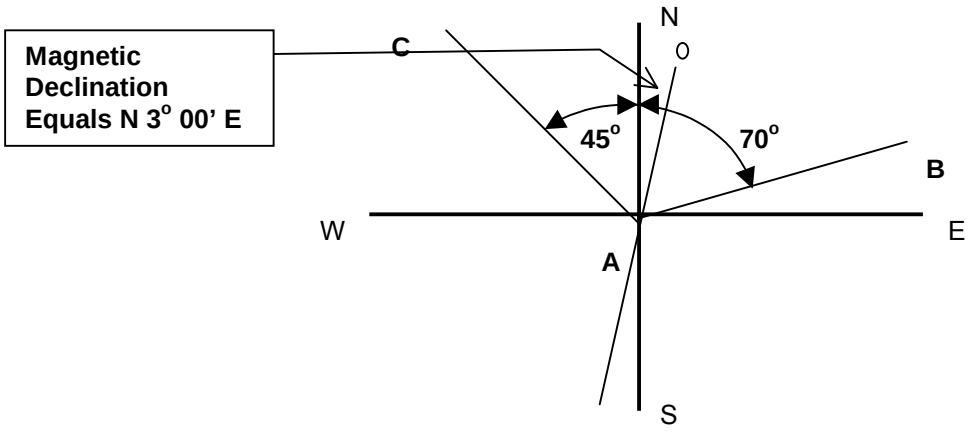
Bearing AB = N 45° E

Bearing AC = S 30° E

Bearing AD = N 45° W

Bearings may be measured from a meridian passing through **True North** or through **Magnetic North**. With the compass of our instrument, we measure magnetic bearings in the field. However, these bearings can be easily converted to true bearings when we know the **magnetic declination** for the area where we are working.

Magnetic Declination – The angle between true north and magnetic north.



True bearing of AB = N 70° E

Magnetic bearing of AB = N 67° E

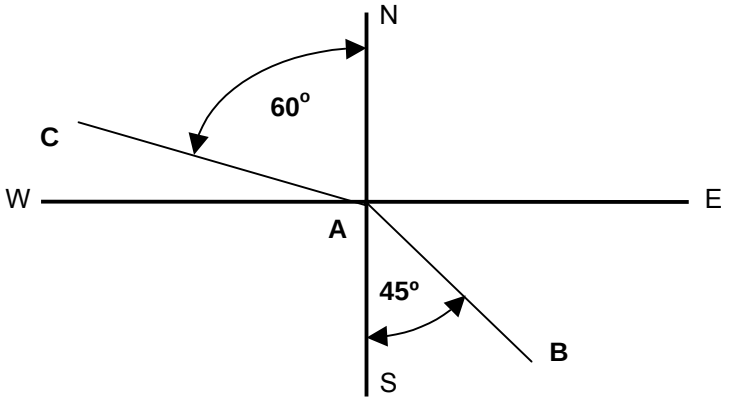
True bearing of AC = N 45° W

Magnetic bearing of AC = N 48° W

Azimuth – The clockwise angle between the meridian and the line being considered.

A bearing cannot exceed 90°, but an azimuth can range from 0° to 360°.

EXAMPLE:



Bearing of AB = S 45° E

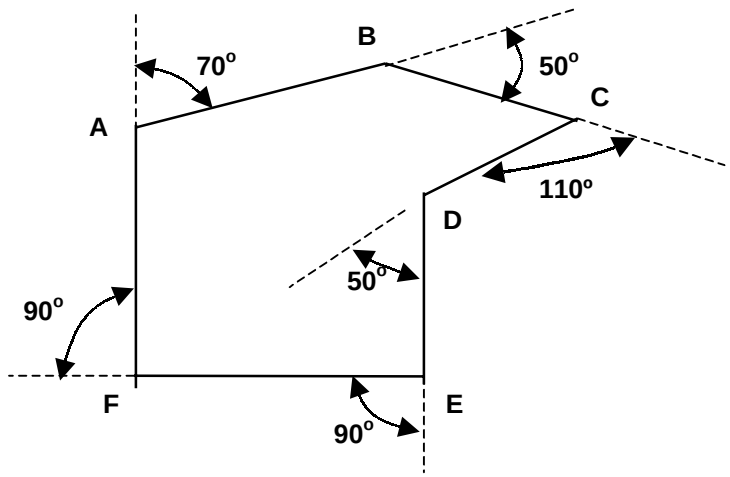
Azimuth of AB = 135°

Bearing of AC = N 60° W

Azimuth of AC = 300°

Deflection Angles – The horizontal angle measured from the prolongation of the preceding line, right or left, to the following line.

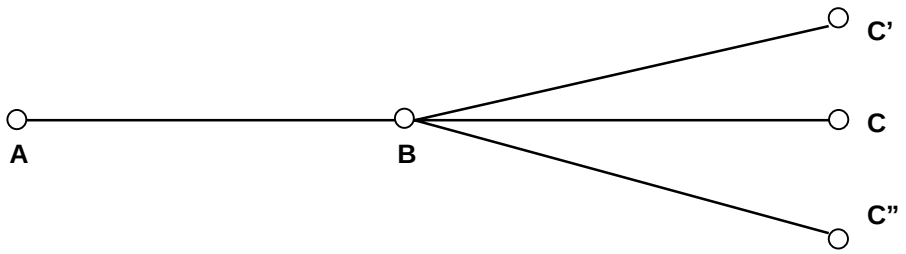
EXAMPLE:



The sum of the deflection angles for every loop or closed traverse is 360°. Deflection angles to the right are plus and those to the left negative.

Double Centering of Instrument

In prolonging a straight line, it is always a good practice to "double-center" the instrument before moving to the point ahead. The procedure for double centering is as follows:



1. Backsight on point **A** with telescope normal. Plunge, set point **C'**.

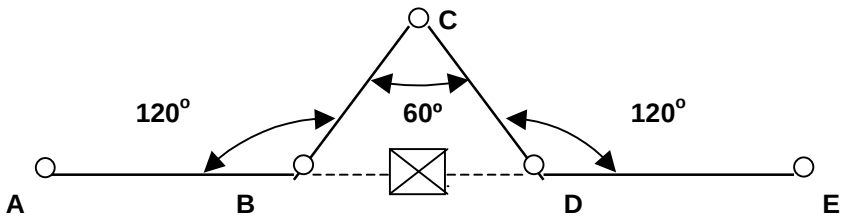
2. Backsight on point **A** with telescope plunged. Instrument to normal position, and set point **C".**

3. Split the distance **C' - C"** to locate point **C**.

Prolonging a line past an Obstacle

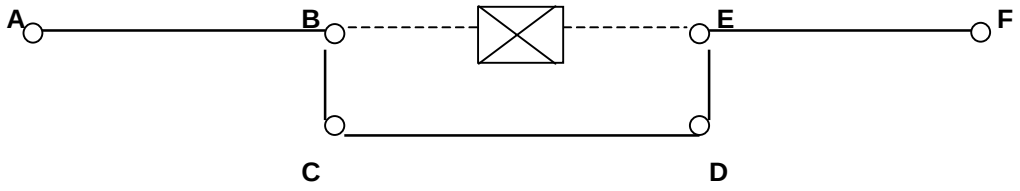
Three methods commonly used are: (a) The equilateral – triangle method (b) The right angle – offset method and (c) The two equal sides and two equal angles method.

Equilateral – Triangle Method



With set-up at Point B, Backsight to Point A and turn 120°, left or right. Set Point C at some distance from B. Move ahead to Point C and Backsight to B. Turn 60°, measure the same distance as measured between B and C, and set Point D. Move to Point D, Backsight to C and turn 120°. This should put us back on the survey line. The distance BD is equal to the distance BC and CD.

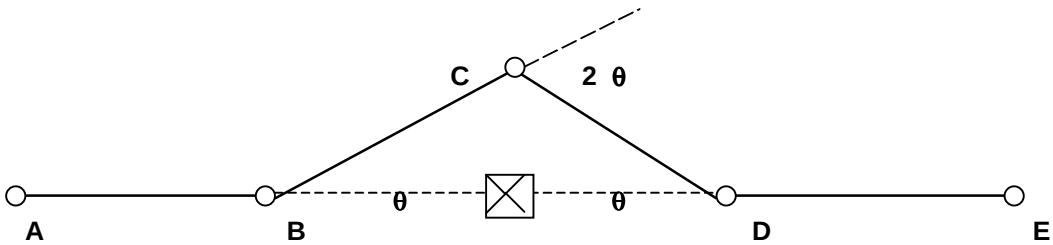
Right – Angle – Offset



With set-up at Point B, Backsight to A and turn 90°. Chain necessary offset distance to C and Set Point C. Move ahead to Point C, Backsight to Point B and turn 90°. Continue along line CD until obstacle is passed. Set Point D, Move ahead, Set up on Point D and turn 90° Measure offset distance and set Point E. Move ahead to Point E, Backsight to Point D and turn 90°. This should put us back on our survey line. The distance BE is the measured distance CD.

Two – Equal Sides and Two Equal Angles

This method involves some simple trigonometric calculations. However, these calculations can be performed by the party chief as the survey party is by-passing the obstacle.



With Set-up at B, Backsight to A, Plunge telescope and turn small angle θ. Chain some distance and set Point C. Move ahead to Point C, Backsight to B, Plunge telescope and turn angle 2 θ. Chain some distance BC and set Point D. Move ahead to Point D, Backsight to C and turn 180° - θ. This should put us back on the desired survey line. After the Party Chief knows the small angle θ and the distance BC, he/she can compute the distance, BD, as follows:

$$\frac{\sin\theta}{BC} = \frac{\sin(180^\circ - 2\theta)}{BD} = \frac{\sin 2\theta}{BD}$$

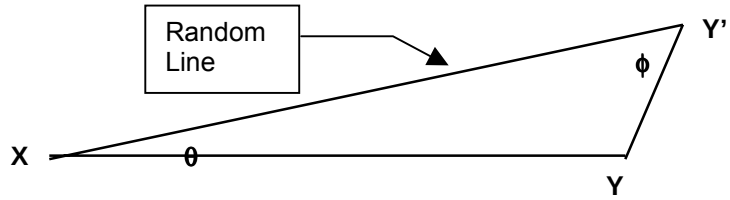
Cross – multiplying:

$$(BD)\sin\theta = (BC)\sin(180^\circ - 2\theta) = BC\sin 2\theta$$

$$BD = \frac{(BC)\sin(180^\circ - 2\theta)}{\sin\theta} = \frac{(BC)(\sin 2\theta)}{\sin\theta}$$

Random Line

On many surveys, it is necessary to run a random line from Point X to a non-visible Point Y. In these cases, the random line is run in the general direction of Point Y, the distance we miss Point Y is measured and the angle of correction is computed.



Procedure: 1. Run random line XY' and chain distance in the process. Measure angle ϕ.

2. Measure distance YY'.

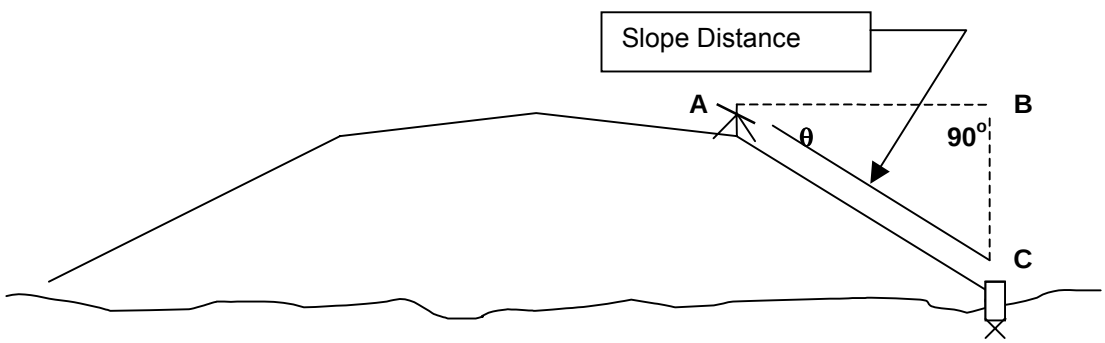
3. Compute angle of correction (θ) by:

$$(XY)^2 = (XY')^2 + (YY')^2 - 2(XY')(YY')\cos\phi$$

$$\frac{\sin\theta}{YY'} = \frac{\sin\phi}{XY}$$

4. Correct line is then run by turning off the computed correction angle.

Computing horizontal distance when Slope Distance and Vertical Angle are Known



With the instrument setting at Point A, we can measure the vertical angle, θ, and the slope distance, AC. We can then compute the horizontal distance, AB, from A to C using the trigonometric function:

$$\cos\theta = \frac{AB}{AC}$$

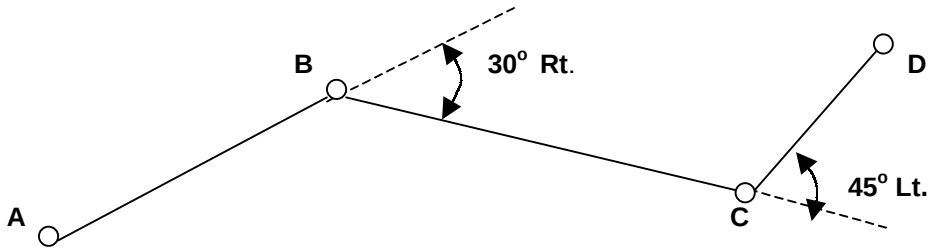
$$AB = (AC)\cos\theta$$

This method of measuring the horizontal distance on steep slopes saves us the trouble of "breaking" the chain. It is also more accurate than "breaking" the chain numerous times. In most cases, it is also faster than breaking the chain. The distance AC must be measured along the line of sight, i.e., one end is held where the instrument fastens to the yoke and the other end is held at the necessary height to intersect the line of sight of the middle horizontal cross hair.

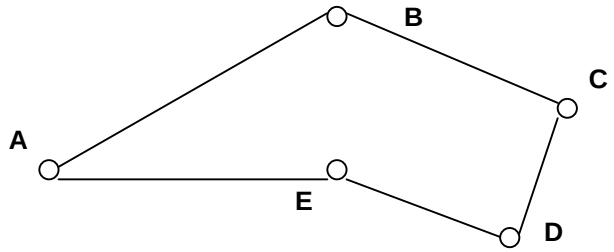
1:2:E:1.23 FIELD ENGINEERING (BASIC SURVEYING OPERATION AND TYPICAL FIELD NOTES)

C. Traversing and Area Computation

A traverse may be either open or closed. An example of an open traverse is the traversing of a stream channel or channel change. An example of a closed traverse is the traversing of a drainage area. Deflection angles play an important part in the analysis of a traverse.



Open Traverse



Closed Traverse

The algebraic sum of the deflection angles of a closed traverse is equal to 360 º, right deflections being considered plus and left deflections being considered negative.

The sum of the interior angles of a closed traverse is equal to:

(N – 2) X 180 º.

Where N = the number of sides of the closed traverse.

A five-sided figure has interior angles totaling
540 º = (5 – 2) x 180 º.

Latitude and Departure

Unlike coordinates, which define a point, latitude and departure define a course or line.

The latitude of a course is equal to the length of the course multiplied by the cosine of its bearing. The departure of a course is equal to the length of the course multiplied by the sine of its bearing.

North latitudes and east departures are considered plus, south latitudes and west departures are considered minus.

The conditions of closure for a traverse are that (a) the algebraic sum of all latitudes must equal zero and (b) the algebraic sum of all departures must equal zero.

Areas

Some of the ways to compute the area of a closed traverse are as follows:

Divide the area into a number of triangles.

Map the area and use a planimeter.

Double Meridian distances and Double Parallel distances.

Coordinates.

Area by Planimeter

When we measure an area using a planimeter, our planimeter reading is in square inches. We then use the scale of our drawing to convert these square inches into square feet.

EXAMPLES:

1. Planimeter reading = 2.50 sq. in.
   Scale of drawing: 1 in. = 5 ft.
   Then 1 sq. in. = 25 sq. ft.

   $$\text{Area} = 2.50 \text{ sq. in.} \times \frac{25 \text{ sq. ft.}}{\text{sq. in.}}$$

   Area = 62.5 sq. ft.

2. Planimeter reading = 12.50 sq. in.
   Scale: 1 in. = 50 ft.
   Then 1 sq. in. = 2500 sq. ft.

   $$\text{Area} = 12.50 \text{ sq. in.} \times \frac{2500 \text{ sq. ft.}}{\text{sq. in.}}$$

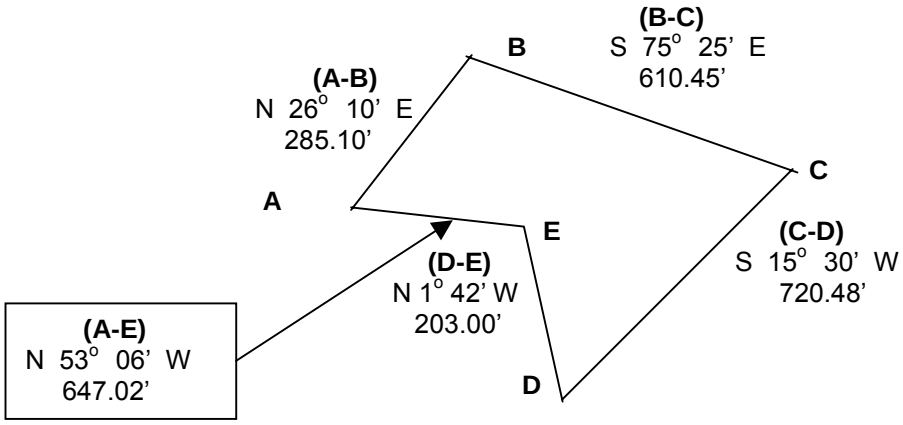
   Area 31,250 sq. ft.

Area by Double Meridian Distance (DMD)

The Double Meridian Distance for any traverse course is equal to the D.M.D. of the preceding course, plus the departure of the preceding course, plus the departure of the course itself. Proper signs of the departures, east plus and west minus, must be considered.

The D.M.D. of a course multiplied by its latitude equals the Double Area.

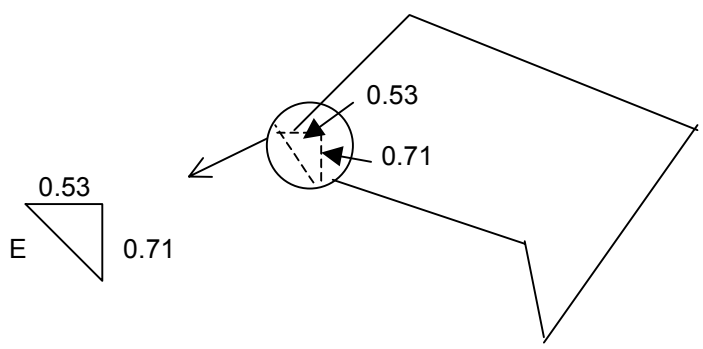
EXAMPLE:



In order to compute the area of this closed traverse we must first compute the latitude and departure of each line or course.

Line	Length	Bearing	Latitude	Departure
AB	285.10	N 26° 10' E	+ 255.88	+125.72
BC	610.45	S 75° 25' E	- 153.71	+590.78
CD	720.48	S 15° 30' W	- 694.28	- 192.54
DE	203.00	N 1° 42' W	+ 202.91	- 6.02
EA	647.02	N 53° 06' W	+ 388.49	- 517.41
		TOTALS	-0.71	+ 0.53

Our latitudes and departures do not total zero and we said this was the condition for closure. Therefore, we have an <u>error of closure</u>.



E = Error of Closure

$$E = \sqrt{(0.71)^2 + (0.53)^2}$$

E = 0.89'

Although our traverse does not close, our error is not so great that we can't balance out latitude and departure by the <u>Transit Rule</u> as follows:

$$\text{Correction in latitude for line} = \frac{\text{Closure in Lat. X Lat. of Line}}{\text{Arithmetical sum of all Lat.}}$$

$$\text{Correction in dep. of line} = \frac{\text{Closure in dep. X dep. of Line}}{\text{Arithmetical sum of all dep.}}$$

Applying the Transit rule, we obtain the following Balanced latitudes and departures:

Line	Latitude	Departure	Balanced Latitude	Balanced Departure
	+ `0.12	- 0.06		
AB	+ 255.88	+ 125.72	+ 256.00	+ 125.66
	- 0.06	- 0.23		
BC	- 153.71	+590.78	- 153.65	+ 590.55
	- 0.29	+ 0.04		
CD	- 694.28	- 102.54	- 693.99	- 192.58
	+ 0.08	+ 0.00		
DE	+ 202.91	- 6.02	+ 202.99	- 6.02
	+ 0.16	+ 0.20		
EA	+ 388.49	- 517.41	+ 388.65	- 517.61
		Total	0.00	0.00

Computation of D. M. D.

Departure of AB = + 125.66 = D. M. D.
D. M. D. of BC = D. M. D. of AB + dep. of AB + dep. of BC
D. M. D. of BC = + 125.66 + 125.66 + 590.55 = + 841.87
D. M. D. of CD = + 841.87 + 590.55 + (- 192.58) = 1239.84
D. M. D. of DE = + 1239.84 + (- 192.58) + (- 6.02) = + 1041.24
D. M. D. of EA = + 1041.24 + (- 6.02) + (- 517.61) = + 517.61

Line	Balanced Latitude	Balanced Departure	D. M. D.	Double Area (+)	Double Area (-)
AB	+ 256.00	+ 125.66	+ 125.66	32169	
BC	- 153.65	+ 590.55	+ 841.87		129353
CD	- 693.99	- 192.58	+ 1239.84		860437
DE	+ 202.99	- 6.02	+ 1041.24	211361	
EA	+ 388.65	- 517.61	+ 517.61	201169	
		TOTALS		444,699	989,790

The smaller of the two double–area totals is subtracted from the larger, and the result divided by two to get the area in square feet.

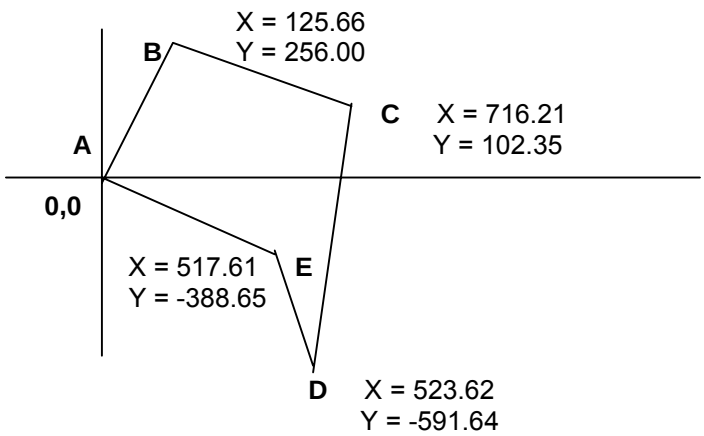
$$\text{Area} = \frac{989{,}790 - 444{,}699}{2} = 272{,}546 \text{ sq. ft.}$$

$$\text{Area in acres} = \frac{272{,}546}{43{,}560} = 6.257$$

Area by Coordinates

The area is equal to one-half the sum of the products obtained by multiplying each Y-coordinate by the difference between the adjacent X-coordinates or the area is equal to one-half the sum of the products obtained by multiplying each X-coordinate by the difference between the adjacent Y coordinates, taken in the same order around the figure.

The coordinates for the traverse considered in the previous example are shown in the figure below:



North and East coordinates are plus; South and West coordinates are minus. These signs must be taken into consideration when applying the following formula:

$$\text{Area} = \frac{1}{2}\left[Y_A(X_E - X_B) + Y_B(X_A - X_C) + Y_C(X_B - X_D) + Y_D(X_C - X_E) + Y_E(X_D - X_A)\right]$$

Point	Y	X	Difference of X's	Double Area (+)	Double Area (-)
A	0.00	0.00	517.61 - 125.66= + 391.95		0
B	+256.00	+125.66	0.00 - 716.21= - 716.21		183,350
C	+102.35	+716.21	125.66 - 523.62= - 397.96		40,731
D	-591.64	+523.62	716.21 - 517.61= + 198.60		117,500
E	-388.65	+517.61	523.62 - 0.00= + 523.62		203,505
A	0.00	0.00			
					545,086

$$\text{Area} = \frac{545{,}086}{2} = 272{,}543 \text{ sq. ft.}$$

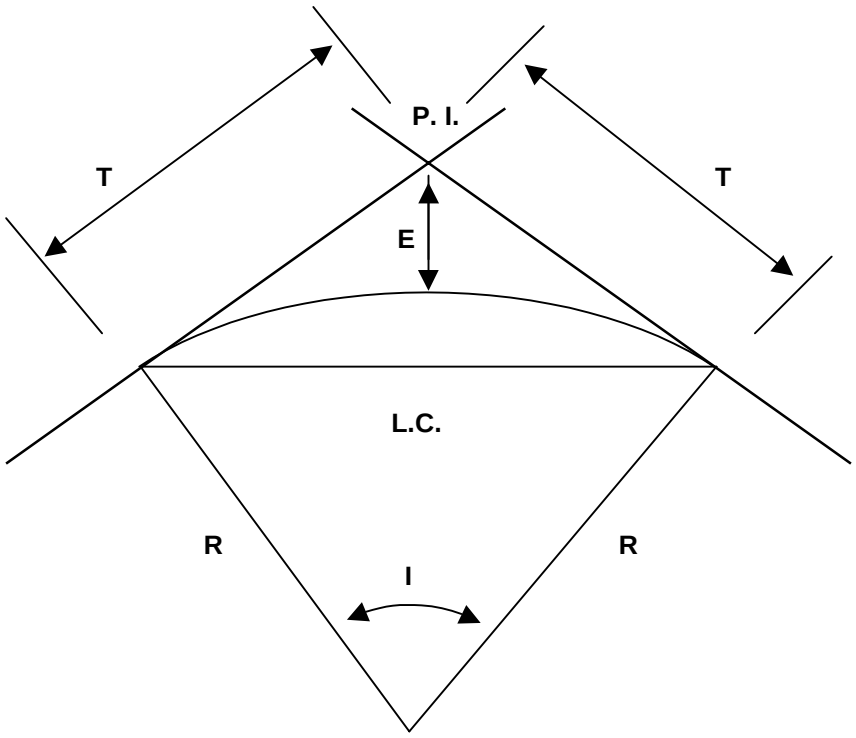
$$\text{Area in acres} = \frac{272{,}543}{43{,}560} = 6.257$$

1:2:E:1.24 FIELD ENGINEERING (BASIC SURVEYING OPERATIONS AND TYPICAL FIELD NOTES)

D. Horizontal and Vertical Curves.

Simple Curves

A simple curve consists of a circular arc tangent to two straight sections of a route.



Notation:

The intersection of the tangents is called the Point of Intersection or P. I. The deflection angle between the tangents is denoted by I or Δ and is called the Central Angle or Delta Angle. The beginning of the curve is called the Point of Curvature or P. C. The end of the curve is called the Point of Tangent or P. T. The distance from the P. C. to P. I. and from P. I. to P. T. is called the Tangent Distance denoted by T. The distance from P. I. to the mid-point of the curve is called the external (E). The distance from the P. C. to P. T. along the curve is called the Length of Curve (L). The distance from the P. C. to P. T. along a straight line is called the Long Chord (L. C.). R. denotes the Radius of Curvature.

Some of the Basic relationships necessary to compute curve values are as follows:

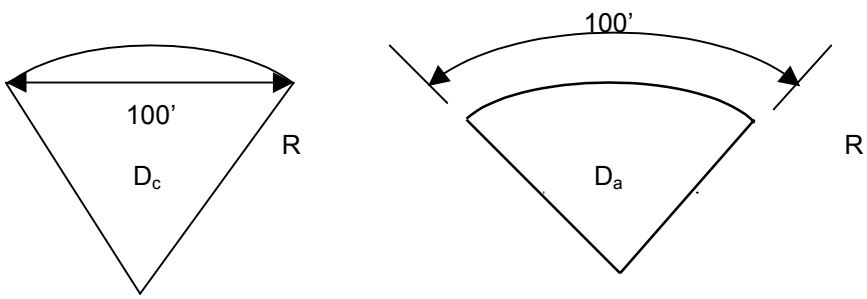
$T = R \tan (I/2)$

$E = R \text{ exsec } (I/2)$, where exsec = sec – 1

$E = R (\sec I/2 - 1)$

$L.C. = 2R \sin I/2$

The two most widely used methods to define the degree of curvature are the **Chord Definition** and the **Arc Definition**.



Chord Definition **Arc Definition**

Chord Definition – the degree of curve is the central angle subtended by a 100-foot chord.

$\sin I/2 \; D_C = 50/R$

Arc Definition – the degree of curve is the central angle subtended by a 100-foot arc.

$$D_a / 100 = \frac{360^o}{2\pi R}$$

$$D_a = \frac{5729.58}{R}$$

The arc definition is most commonly used by highway personnel.

When measuring in a curve, we must chain along the curve using chords, since it is impossible to chain along the arc of the curve. In general, for curves greater than 4 degrees, a correction should be applied to the length of the chord being chained.

When using the arc definition this correction factor is given by:

$$\text{correction} = \frac{Arc^3}{24R^2}$$

EXAMPLE: For a 100 ft. arc and degree of curve - 10º

$$R = \frac{5729.6}{10} = 572.96$$

$$C = \frac{(100)^3}{(24)\,(572.96)^2} = \frac{1{,}000{,}000}{7{,}878{,}792}$$

C = 0.12

Chord Distance = 100.00 – 0.12 = 99.88'

Length of Curve (L) = I/D

L is in stations
I and D are in degrees
P. C. Sta. = P. I. Sta. – T
P. T. Sta. = P. C. Sta. + L

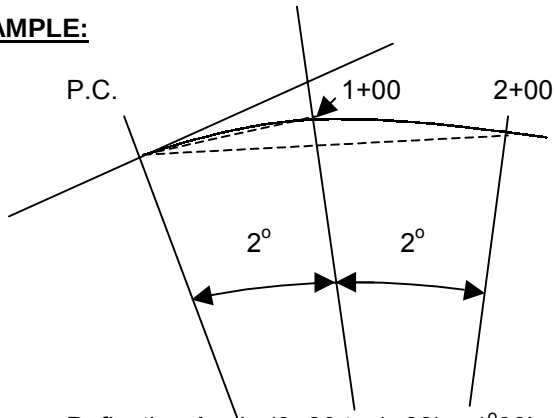
"Laying-out" a Simple Curve

The most convenient way to "lay-out" a simple curve is the Deflection – Angle Method.

In order to establish the P. C., and P. T. of the curve, we chain the Tangent Distance from the P. I. then, beginning at the P. C. of the curve, progress around the curve by turning the proper deflection angle for the following Station and chaining the appropriate chord distance.

The deflection angle is the angle formed by the tangent to the curve and the chord to the point. Its value is equal to one – half (1/2) the angle subtended by the chord.

EXAMPLE:



Deflection Angle (0+00 to 1+00) = 1º00'
Deflection Angle (0+00 to 2+00) = 2º00'

From the preceding example, it can be seen that the deflection angle is equal to the degree of curve divided by two; multiplied by the distance in stations.

$$d = \frac{D}{2} \times s$$

where

d is in degrees

D is in degrees

S is in stations

EXAMPLE :

Given : P. I. Sta. = 24+63.8

T = 196.1'

I = 34º14'

Da = 9ºrt.

L = 380.4
E = 29.5

Solution

P. C. Sta. = 24 + 63.8 – 196.1 = 22 + 67.7

P. T. Sta. = 22 + 67.7 + 380.4 = 26 + 48.1

STATION	POINT	TOTAL DEFLECTION		Center Line	
27+00				90º	90º
+50				R.P. R/W	R/W R.P.
+48.1	P. T.	17° - 07'			
26+00		14° - 57'			
+50		12° - 42'		15' 100'	100' 20'
25+00		10° - 27'			
+50		8° - 12'			
24+00		5° - 57'			
+50		3° - 42'		90º	90º
23+00		1° - 27		R.P. R/W.	R/W R.P.
+67.7	P. C.	0° - 00'			
+50					
22+00				20' 100'	100' 15'

To obtain deflection at 23+00:

(23 + 00) – (22 + 67.7) = 32.2' or .323 sta.

$\frac{9}{2}$ X (.323) = 1.4535°
1° 27'

To obtain deflection at 23+50:

(23 + 50) - (22 + 67.7) = 82.3' or .823 Sta.

$\frac{9}{2}$ X (.823) = 3.7035°
= 3° 42'

OR

For every 50 ft. we are turning $\frac{D}{2}$ X S = $\frac{D}{2}$ X $\frac{1}{2}$ = D/4

$d_{50'}$ = D/4 = 2° 15'

$d_{23+50} = d_{23+00}$ + 2° 15'

d_{23+50} = 1° 27' + 2° 15' = 3° 42'

As a check, our deflection at the P.T. should equal ½ the Central Angle.

$$\frac{34^\circ\ 14'}{2} = 17^\circ\ 07'$$

In most cases, we will not be able to run the entire curve from one set-up at the P.C. because of obstacles involved. Consequently, we must move to different points along the curve. These points are called Points on Curvature or P.O.C.'s.

Move up the curve according to the following rule-of-thumb:

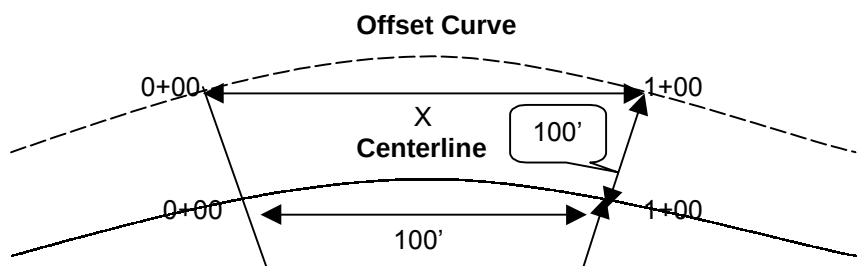
To move up on a curve and retain our original notes, occupy any station and backsight to any other station with the vernier set to the total deflection of the Station sighted. This total deflection must be placed on the correct side of 0°.

Parallel or Offset Curves

Many times we must "run-in" a curve which is parallel to our centerline curve. If the same degree of curve and deflections are used for our parallel or offset curve as are used for our centerline curve, a correction in distance between stations must be applied.

One method of obtaining this corrected distance is by applying the rule of similar triangles.

EXAMPLE:

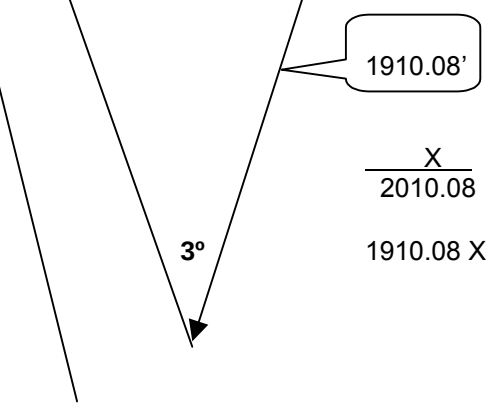


ALTERNATE METHOD

Let: X = correction per 100'
D = degree of curve
D = distance of offset curve

Then: X =d Tan D
=(100')(Tan 3°)
=(100) (0.0524)
X = 5.24' /100'

Note: If offset is on outside of curve, add; on inside, subtract.



$$\frac{X}{2010.08} = \frac{100}{1910.08}$$

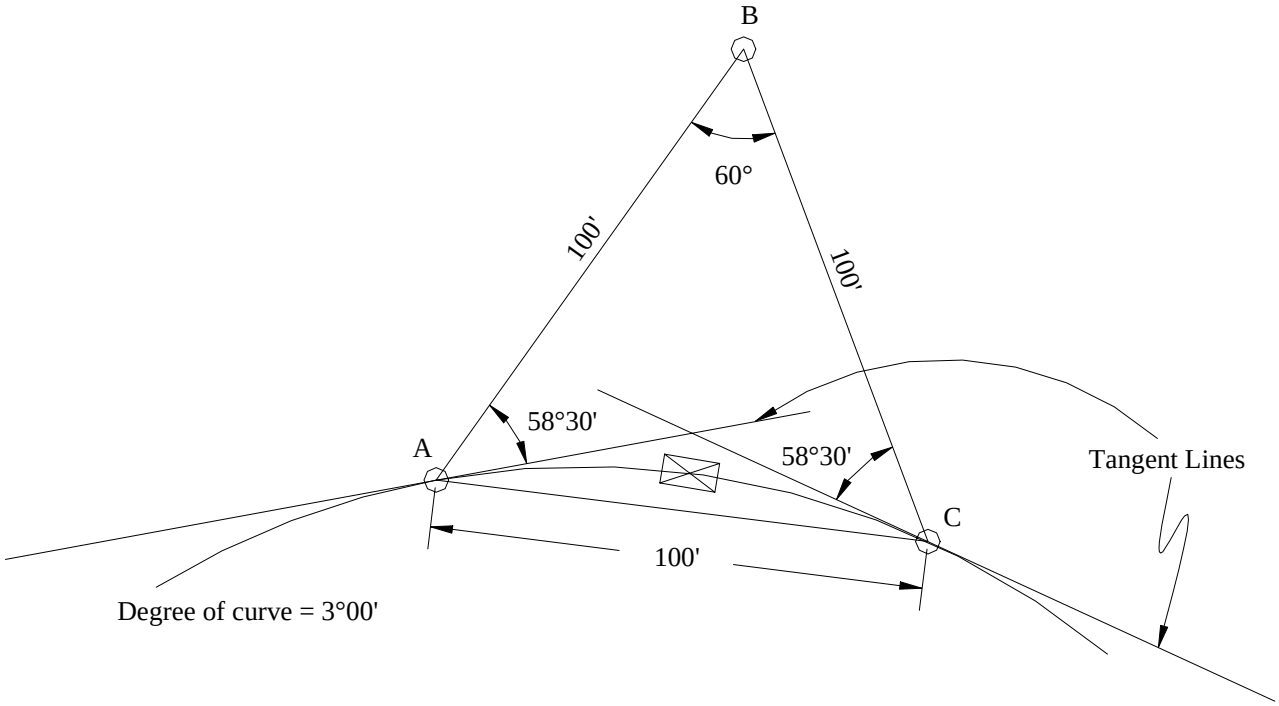
1910.08 X = 201008

X = 105.25

On our offset line, we should chain 105.25 ft. between station 0+00 and station 1+00.

A good example of an offset curve is our R. O. W. line.

Procedure for Offsetting Around an Obstacle in a Simple Curve.



Step 1: Set Point "A" at an even station on approach side of obstacle.

Step 2: Get tangent to the curve at Point "A" by back sighting to any station on the curve and turning the difference in deflection between that station and Point "A".

Step 3: By using the equilateral triangle angle of 60º and the deflection angle between Point "A" and "C", the angle between the tangent line at "A" and Point "B" can be established. For our example of a 3º 00' curve, this angle is 58º 30'. Turn the computed angle and set Point "B" at a distance from Point "A" equal to the distance between "A" and "C".

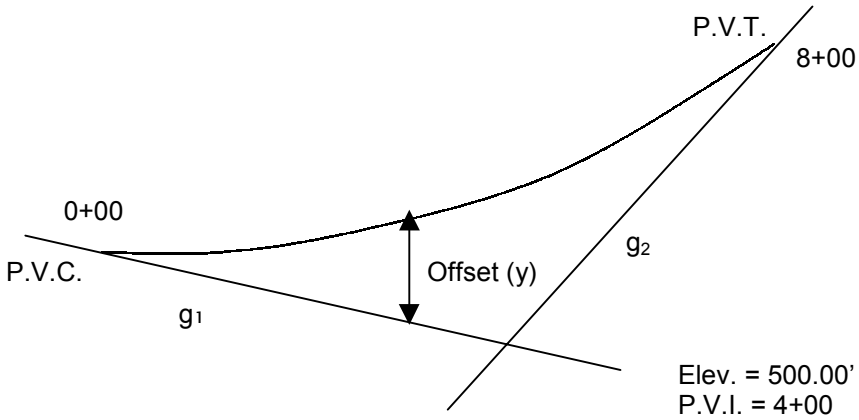
Step 4: Set up at "B", backsight to "A" and turn 60º. Set point "C" at a distance equal to the distance "AC" and "AB".

Step 5: Set up at "C", backsight to "B" and turn the previously computed angle between the tangent line at "C" and the line from "C" to "B".

Step 6 We are now sighting along the tangent line at "C" and can turn forward deflections from this tangent.

Vertical Curves (Equal Tangents)

The vertical curve is sometimes called a parabolic curve, since it is in the form of a parabola.



Equal – Tangent Vertical Curve

The length of the vertical curve is the horizontal distance from the P.V.C. to the P.V.T. Most of our vertical curves are "equal-tangent", meaning the distance from the P.V.C. to P.V.I. to P.V.T. is the same. However, we may sometimes have an unequal-tangent vertical curve in which these distances are not equal.

The basic relationships for solving the equal-tangent vertical curve are as follows:

offset (y) = $a X^2$

where a = rate of gradient change

X = distance in Stations from P.V.C. or P.V.T.

$$a = \frac{g_2 - g_1}{2L}$$

where: g_2 = grade ahead

g_1 = grade back

L = length of vertical curve in stations

therefore,

$$\text{offset} = \frac{g_2 - g_1}{2L} X^2$$

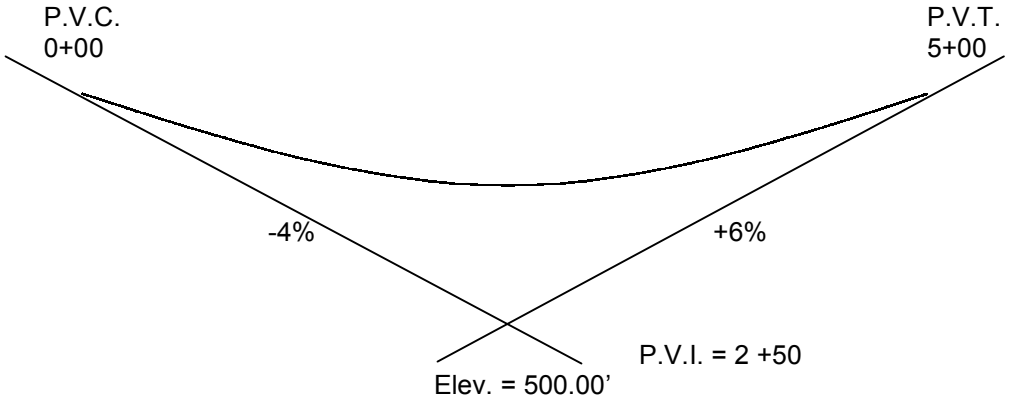
Solution of Vertical Curve

Step 1: Using a given elevation on the tangent (P.V.I., P.V.C., or P.V.T.) and the % grade compute the tangent elevation at the Stations where elevations of the vertical curve are desired.

Step 2: Compute offset at Stations where elevations of curve are desired. The Distance, X, is taken from P.V.C. when working back of P.V.I. and is taken from P.V.T. when working ahead of P.V.I.

Step 3: Add or Subtract the offset to the tangent elevation to obtain the curve elevation.

EXAMPLE:



Compute Vertical Curve grades at 2+00 and 4+00.

Tangent elev. at 2+00 = 500.00 + (.5) (4) = 502.00

Tangent elev. at 4+00 = 500.00 + (1.5) (6) = 509.00

$$A = \frac{g_2 - g_1}{2L} = \frac{+6 - (-4)}{10} = \frac{10}{10} = 1$$

offset = a X^2

offset at 2+00 = (1) (4) = 4'

offset at 4+00 + (1) (1) = 1'

curve elev. at 2+00 = 502+00 + 4.00

= 506.00

curve elev. at 4+00 = 509.00 + 1.00

= 510.00

1:2:E:1.25 OFFICE ENGINEERING

While the project field personnel are performing staking operations, office personnel will be busy setting up files and field books for use during the course of the project.

One of the major tasks of office personnel will be to compute the finish and subgrade elevations for the entire project using the profile grade, paving layout sheets and typical sections contained in the construction plans. Finish and subgrade elevations at the centerline or crownline, edge of paving, shoulder, and ditch line, along with back slope and front slope ratios should be recorded in a field level book for each roadway. These books will be invaluable to the Chief Inspector and Chief of Party as construction progresses. The general form of these field books is listed below:

Subgrade Elevations (Rt. Roadway)

	B.S.	Ditch	F.S.	Shldr.	E.P.	℄	E.P.	Shldr.	F.S.	Ditch	B.S.
1+00											
	-	-	4:1	199.17	199.75	200.00	199.75	199.17	4:1	198.17	3:1
				26	12		12	26		30-33	
1+50											
			4:1	198.17	198.75	199.00	198.75	198.17	4:1	197.17	3:1
				26	12		12	26		30-33	

From the grade books, other necessary field books such as slope staking, blue-topping, and control elevation books can be set up in the office prior to construction staking.

As original cross sections are taken in the field, office personnel will be busy plotting these original cross sections. Using the finish and subgrade books previously made; the template (roadway section) can be placed at each station in proper relationship to the original cross section. The area existing between the original ground line and the roadway section can be arrived at using a planimeter and from this area the volume of excavation or fill required at each station can be determined.

In many cases, in lieu of performing the above described procedure in the project field office, original cross section notes and construction plans may be utilized by Project or Division Office personnel to plot area computations and slope stake books with the use of a computer. However, the computer method is not without error, and for projects with many paving transitions this method may actually be less accurate and efficient in the long run than the long hard office route. In any case, work, which is performed by the computer, should be carefully checked once it is returned to the project office.

As right-of-way hub elevations are taken by the field party, office personnel can establish the slope stake books and actually begin writing grade stakes with appropriate cuts and fills for ditch, shoulder, edge of paving and centerline for later placement in the field. Cross sections will be taken on borrow pits and office personnel will be responsible for plotting these original sections.

Pipe sections of the original ground line will be taken by the field party. Using these original sections, along with pipe grades and flowline elevations established or shown in the construction plans, office personnel will plot the pipe flowline in comparison to original ground line for a determination of the amount of structure excavation to be performed and length of structure to be installed.

These are only a few of the many important tasks to be performed by office personnel during the preliminary phases of project staking and you can see that the office man becomes a "key man" in the success of a project.

1:2:F CONTRACT ADMINISTRATION (CONTRACTOR FURNISHED ENGINEERING CONTROLS)

When item 680-A is included within the proposal the Contractor will be responsible for furnishing, placing, and maintaining construction stakes, lines, and grades necessary for the proper prosecution of the work.

After the project has been awarded and prior to the Contractor beginning work, the Engineer should furnish the Contractor with all roadway design data required to satisfactorily complete the project. In the event that all roadway design data is not immediately available the Engineer shall coordinate with the Contractor as to the areas he/she plans to begin clearing and grading operations. This coordination will enable the Engineer to concentrate his/her efforts in furnishing initial roadway design data for the areas where work is intended to begin. The Contractor shall continue this coordination to avoid any unnecessary delays in the prosecution of the work.

Initially the Engineer will furnish the Contractor with centerline control points (P.C.s, P.O.C.s, P.T.s, P.O.T.s, etc.) at intervals along the mainline necessary for the Contractor to establish alignment on all roadways, ramps, crossroads, service roads, etc. Benchmarks will be furnished at intervals along the project for vertical control. The Engineer will furnish a minimum of two horizontal control points and one benchmark for vertical control at each bridge site.

The Contractor shall check all furnished controls as a first order of work to insure its accuracy. The Contractor will be responsible for the layout, installation, integrity, and preservation of the control data furnished by the Engineer.

Additional requirements, stipulations, and responsibilities of both the Contractor and the Department are found in section 680 of the Standard Specifications.

1:2:F:1.1 DEPARTMENT RESPONSIBILITY

Sequence for engineering provided by Department utilizing “Conventional” engineering equipment and procedures outlined in “Field Engineering” section of this manual.

Re-establish centerline to include control points (P.C.s, P.O.C.s, P.T.s, P.O.T.s, etc; Provide control points to geometrically tie ramps, crossroads, service roads, etc. to the mainline roadway.

Run benchmark Level loop from B.O.P. to E.O.P.

Profile centerline from B.O.P. to E.O.P.

Stake right-of-way lines.

Take and plot original cross sections.

Mark clearing and grubbing limits.

Take final excavation cross sections.

Sequence and procedures for Engineering Controls provided by Department utilizing “Total Station” (Electronic Data Collection) engineering equipment.

If not provided in construction plans, calculate coordinates for centerline control and Right-of-Way points.

Run control loop tying to centerline control.

Run level loop tying original benchmarks to established elevations of control points.

Note! Use Self-Indexing, Automatic type levels for accuracy of this work.

Set R.O.W. points.

Stake clearing limits.

Provide line and elevation control for bridges.

Perform original topographic survey.

Perform final topographic survey.

1:2:F:1.2 CONTRACTOR RESPONSIBILITY

Sequence for engineering provided by Contractor utilizing “Conventional” or “Total Station”(Electronic Data Collection) engineering equipment and procedures outlined in “Field Engineering” section of this manual.

Check Control Data furnished by ALDOT.

Re-establish centerline and control points.

Set slope stakes.

Stake out bridges

Stake out drainage structures.

All inspection and measurements for payment required by the plans and specifications will be performed by the Department and is not classified as a part of the engineering controls.

The Department will perform monthly (or as needed) cross sections or topographic surveys to determine quantities for estimate pay purposes.

1:2:G CONTRACT ADMINISTRATION (PRE-CONSTRUCTION CONFERENCE)

Immediately after award of the contract and prior to issuance of the Notice to Proceed the Division Construction Engineer shall make arrangements for a conference between Department personnel, the Contractor, Utility Company representatives, FHWA Area Engineer (if Federal funded project) and other interested parties. The Department personnel invited should include construction representatives from the Central Office (Utility, Traffic Engineer and Electrical Engineer, if applicable) and all Division, District, and Project personnel associated with construction, right-of-way, materials, utilities, and other pertinent areas.

The purpose of the conference is to introduce everyone who will be actively associated with the job, to discuss the plans, specifications, special provisions and unusual conditions on the project, and to find out how the Contractor plans to staff and construct the project.

A suggested agenda for the pre-construction conference is as follows:

1. Introduction. All people present should be introduced with their responsibilities toward the project clearly outlined. During this introduction the Contractor should be advised of the "chain of command" and the importance of making all submissions, letters, reports, etc. through the Project Engineer unless otherwise advised in writing.

2. Division Construction Engineer is to give a brief description of work required under the contract.

3. Contractor's Schedule of Operations, Erosion Control Plan, Plan for Disposal of Debris from Clearing and Grubbing, Plan for Control of Concrete Temperature during Hot Weather, Plan for Fire Prevention. The Contractor 's progress schedule of operations should be discussed in detail with the Contractor explaining anticipated material delivery dates, when he/she proposes beginning all major operations, the amount and types of equipment and personnel he/she plans using on the project, and all other information which the Department must know in order to adequately staff the project for stakeout and inspection. The Contractor should explain other schedules such as the erosion control plan in detail. The dates of receipt of the other necessary plans should be noted for the record. If not received prior to the Pre-Construction Conference, they should be received prior to beginning work.

4. Permits and/or clearances provided by the State, as well as those required of the contractor, to include: Storm Water, Historical and Archaeological, Endangered Species, Impacted Wet lands, Corp of Engineers, etc. should be discussed to insure that they are on file or application has been made.

5. The timely submittal of applicable shop drawings, working drawings, material submittals, job-mix formulas, etc. forwarded to the project engineer in accordance with the time limits outlined in the specifications and special provisions should be discussed and emphasized.

6. Utilities. The utility companies represented should give a description of their utility conflicts and when they propose having the adjustments completed. Any problems the utility representative anticipates should be explained so the Department and the Contractor can adjust their plans accordingly. Each utility representative should provide the Contractor with a name and telephone number to contact when conflicts arise or assistance is needed on the project.

7. Discussion of R.O.W. The Division Right-of-Way Engineer should discuss any encroachments or anticipated Right-of-way conflicts. If any work is to be done on railroad R.O.W., is executed Railroad Agreement in hand? It should be stressed that the Contractor give the railroad company a 10-day minimum notice prior to starting work on their right-of-way.

8. Discussion with other Contractors of their operations in the area of the project in order to bring out any possible conflicts and needed coordination.

9. Discussions of the provisions for open burning by the Alabama Air Pollution Control Commission. Give the Contractor a copy of the "blanket" permit for open burning by the Commission unless the project is in the jurisdiction of one of the four local air pollution control agencies (Jefferson County, Mobile County, Lawrence County, Limestone County, Marshall County, City of Huntsville) in which case a special burning permit from the local agency will be required.

10. On Federal Aid construction contracts of $1 million or more for projects on the National Highway System the Contractor should be provided with blank copies of **Form FHWA-47**, Statement of Materials and Labor, and advised that this form must be completed prior to final project acceptance.

11. Discuss the submission of labor payrolls.

12. Request the following information, in writing, from the Contractor:

(a) Name of Company and Project Safety Officer.

(b) Name of Company EEO Officer.

(c) Affidavits authorizing persons to sign labor payrolls.

(d) Name of Project Superintendent and his/her telephone number where he/she can be reached in case of emergency after working hours.

(e) Name of individual designated to provide traffic control surveillance and his/her telephone number where he/she can be reached in case of an emergency after working hours.

(f) Name of material suppliers and sources for the establishment of asphalt and concrete design mixes.

13 The persons responsible for monitoring these activities within the Division should conduct a discussion of EEO, Safety and Trainees. On projects containing the D.B.E. Contract Obligation Special Provision, the approved DBE plan should be discussed to assure that the Contractor meets his/her DBE requirements. The various items approved on the DBE plan should be discussed and a clear understanding of what is expected from both the Prime and Subcontractor should be reached.

14. Discuss Plans, Specifications and Special Provisions. A general review of the plans should be made with emphasis placed on unusual construction features and special drawings. When a Contractor is from out of state and is not familiar with Department contracts, the Standard Specifications should be discussed with emphasis on time charges, extra work (Supplemental Agreement or Force Account), materials approval and other similar items. Special Provisions should be discussed in detail so any questions can be resolved before work begins on the items covered. Each pay item of the contract should be read out and any questions concerning the method of measurement or payment discussed.

15. Sequence of Construction and Traffic Control. Special emphasis should be placed on the special provisions and plan sheets detailing the sequence of construction and traffic handling schemes. The Contractor should be made aware of his/her responsibility to handle traffic safely through the work zone. Plan sheets will detail traffic handling schemes to be installed during the various phases of construction. The method of payment for the various traffic control devices should be discussed and clearly understood by both the Contractor and Project Engineer.

16. Subcontractors - All Subcontractors should be given an opportunity to ask questions or discuss items with which they will be concerned. The Prime Contractor should be advised that no work by a Subcontractor would be permitted on the project until written approval is received from the Central Office.

17. If it is obvious that equipment and/or personnel are being used on the project, which are not the Prime Contractors and are not covered by subcontract, the Prime Contractor will be required to furnish a rental agreement for the equipment and carry personnel performing such work on his/her certified labor payroll.

The above listed agenda may not be complete for all projects, but is given as a guideline in preparing topics for discussion at a Pre-Construction Conference. It is suggested that a written listing of topics for discussion at the conference be prepared and furnished to each individual prior to commencing the Conference. This listing will generally aid in developing a smooth flow from one discussion to another.

Minutes of the Pre-Construction Conference shall be electronically recorded (Audio or Video) and followed-up with transcribed typed copies submitted to all organizations attending, including the Bureau of Construction and the Federal Highway Administration, if Federal Funds are involved. The Audio/Video recording device tape, disk, card, or other data recorder and a copy of the Transcribed minutes shall be maintained in the Division Office as part of the project records for a time period as required by Alabama Code.

1:2:H CONTRACT ADMINISTRATION (SUBCONTRACTS AND RENTAL AGREEMENTS)

The Contractor shall perform with his/her own organization contract work amounting to not less than 30 percent of the original total contract price, except that any items designated by the State as "Specialty Items" may be performed by subcontract and the amount of any such "Specialty Items" so performed may be deducted from the original total contract price before computing the amount of work required to be performed by the Contractor with his/her own organization.

In addition to the 30 percent requirement, the Contractor shall furnish (a) a competent superintendent or foreman who is employed by him/her, who has full authority to direct performance of the work in accordance with the contract requirements, and who is in charge of all construction operations (regardless of who performs the work), and (b) such other of his/her own organizational capability and responsibility (supervision, management, and engineering services) as the Alabama Department of Transportation contracting officer determines is necessary to assure the performance of the contract.

1:2:H:1.1 Subletting

No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the Alabama Department of Transportation's contracting officer, or his/her authorized representative. Such consent when given shall not be construed to relieve the Contractor of any responsibility for the fulfillment of the contract. Request for permission to sublet, assign, or otherwise dispose of any portion of the contract shall be in writing.

By execution of the request, the Prime Contractor gives assurance that all pertinent provisions and regulations including labor standard provisions of the Prime Contract have been furnished to the Subcontractor and made a part of the subcontract agreement. By execution, the Subcontractor certifies that he/she has been furnished a copy of the pertinent provisions and regulations including labor standard provisions of the Prime Contract that relate to the items of work in the Subcontract.

The fully executed request for permission to sublet work is submitted by the Prime Contractor to the Office Engineer after an agreement has been made between the Prime Contractor and the Subcontractor to perform the work. The Office Engineer will check the request for accuracy and after proper execution by the Transportation Director, distribution of the approved document will be made to all parties concerned. **The Subcontractor shall not be allowed to proceed with the work until the request for permission to sublet work has been approved and completely executed.**

When the Prime Contractor sublets work, the Subcontractor to whom the work is sublet becomes the second tier Contractor. When a second tier Contractor sublets work, the Subcontractor to whom the work is sublet becomes the third tier Contractor. The request for permission to sublet work must be executed by all three Contractors. The number of tier Contractors will in no way relieve the Prime Contractor of any responsibility for fulfillment of the contract.

Each Prime Contractor to perform work for the Alabama Department of Transportation must be pre-qualified with the State of Alabama. Each Prime Contractor and Subcontractor shall have on file in the Bureau of Office Engineer a certificate of insurance as required under Article 107.15 of the Standard Specifications.

1:2:H:1.2 Rental Agreements

In certain instances, a Subcontractor may wish to rent equipment from another contracting organization or equipment company.

When rented from another contracting organization, the Subcontractor may operate such rented equipment with personnel of his/her own organization or with personnel of the contracting organization from which the equipment is rented. A properly executed rental agreement must be obtained on all equipment so rented only when such equipment will be operated by personnel of the contracting organization furnishing the rented equipment. Such personnel must be carried on the authorized Subcontractor's payroll.

Rental Agreements must have both the Authorized Subcontractor's signature and the signature of the contracting organization furnishing the rented equipment with each agreeing to the provisions set forth in the agreement. Agreements must be forwarded to the Project Engineer for his/her inspection and forwarded to the Division for concurrence of the Division Engineer.

Rental Agreements will not be required for equipment rented from an equipment company or another contracting organization when operated by personnel of the authorized Subcontractor.

Where DBE participation must be documented, a rental or lease agreement will always be required between the Disadvantaged Business Enterprise and the Contracting organization from which the DBE is renting or leasing equipment. These agreements must also address whether the operator will be an employee of the DBE or other contracting organization.

Click to Proceed
to
Updated Section

Click to Proceed
to
Updated Section

1:2:J Contract Administration (Occupational Safety and Health Procedures)

As stated in Article 107.06 of the Standard Specifications, it is the responsibility of the Contractor to comply with all Federal, State, and local laws, rules and regulations concerning construction safety and health standards**. Section VIII of Form FHWA-1273** contained in the contract also makes reference to the Contractor's responsibility for the safety of employees on the job and of the public during the performance of the contract.

During the course of the project, inspectors from the Occupational Safety and Health Administration (OSHA) may make inspections of the Contractor's operation to determine any violations of OSHA standards. OSHA guidelines are published in the Federal Register on Occupational Safety and Health Standards.

1:2:K Contract Administration (Equal Employment Opportunity and Trainee)

The Equal Opportunity Coordinator has the responsibility of administering the Department of Transportation EEO Program. This responsibility covers "in-house" EEO Activities, contract EEO requirements, Disadvantaged Business Enterprise, Title VI regulations and minority recruitment. All implementing instructions pertaining to EEO are prepared and issued by the EEO Section to the various Bureaus and Divisions. The EEO Coordinator maintains constant contact with all Division Offices to assure uniform understanding and administration of the EEO program throughout the state.

The Division Offices receive instructions from the Central Office and then disseminate it to District and Project Engineers, Contractors and Subcontractors as applicable to their particular function or phase of work. The Division Offices also receive reports and other data from Project Engineers and after review and evaluation by the Division EEO Officer, applicable data is transmitted to the Central Office. The Division Office is responsible for scheduling and conducting Contractor EEO Compliance Reviews.

The Project Engineer receives instructions from the Division Office through the District Engineer and handles with the Prime Contractor. He/she is responsible for continuous observation of the Contractor's operations, for interviewing Contractor's employees, for obtaining EEO reports and documentation of the Contractor's efforts and accomplishments, for maintaining project EEO records and for checking and transmitting data to the Division Office.

The Project Engineer will develop complete EEO Files that will show the Contractor's total EEO activities on the project**.** **PR-1391s**, trainee reports, employee interview reports, compliance review reports, MBE/DBE, and EEO correspondence files are maintained by the Division EEO Officer. The Central Office maintains a current project file, which contains correspondence, Contractor review materials, trainee enrollment and termination information, final tabulation of trainees; also, original trainee determinations and changes in this determination.

The Project Engineer will make at least one interview per month, per fifteen employees, on projects with fifteen or more people, and on projects with less than fifteen employees, at least one interview per month. Unless discrimination is suspected not more than one interview should be made of the same person in a year's period.

If the D.B.E. Contract Obligation Special Provision was included in the contract, the Project Engineer should ascertain that the DBE on the job is on the approved plan and document the items of work the DBE actually does. To help ascertain the identity of the DBE, it is suggested that each employee of the DBE be interviewed at least once. Work performed by a DBE not identified, as a DBE on the approved plan will not be considered as part of the fulfillment of this special provision.

The Contractor will prepare and submit **PR-1391s**, monthly trainee reports for each active trainee on the project, quarterly MBE/DBE utilization/progress reports, and documentation to prove his/her compliance with all EEO and MBE/DBE requirements in the Special Provisions. Also, the Subcontractors will furnish the Project Engineer, through the Prime Contractor, documentary proof of their compliance.

The Division EEO Officer should make regular visits to the Project Engineer’s office and review his/her files to determine if the Contractor is complying with the contract provision. If the Division Engineer feels that the Contractor or Subcontractor is not making his/her best effort in supply of records necessary to determine compliance with EEO requirements in the contract, he/she may temporarily withhold monthly estimates as a means of impressing upon the Contractor the necessity for supply of those necessary records.

The Division EEO Officer schedules Contractors for review. All Contractors or Subcontractors with a contract of $500,000 or more will be reviewed. This review will be on each project that the Contractor holds with at least a $500,000 contract. This could mean a particular Contractor might be reviewed multitudinous times.

The Division EEO Officer will look at a new project determining the amount of time required completing the project. If the project will be completed in a short time, as is the case in most resurfacing projects, the Division EEO Officer may have to schedule the review for the first day or week of construction. If the project will extend through the normal construction season he/she will plan to review this project during the spring and if the project extends through several seasons he/she will review it during each spring. On a project with a sub-contract of $500,000 the Subcontractor may be reviewed at a different time from the Prime Contractor.

The spring reviews will be coordinated by the Central Office and should occur during March, April or May. At the request of the Contract Compliance Officer, the Division EEO Officer will furnish a list of those projects scheduled for review in the spring. The Contract Compliance Officer will compile a list of reviews to be held in each Division. Contractors with multi-projects will, in most cases, be reviewed in only one Division with all projects being reviewed simultaneous.

If the Equal Opportunity Coordinator determines that there are more projects to be reviewed than the Division EEO Officer can make in a feasible time (2 to 3 days), he/she will request other Division EEO Officers to come into the Division and assist in the reviews.

After the Contractor has been selected for review, he/she is notified by letter at least fifteen (15) days prior to the date of the review. The letter will give the Contractor information concerning the review and request that he/she furnishes the following information prior to the review:

1. Copy of all union agreements applicable to project/s being reviewed.

2. Current **PR-1391** for each project being reviewed and a company-wide **PR-1391** (covering all Federal-aid highway construction work in Alabama.)

3. List of new hires for last 30 days.

4. List of employee referral sources contacted and a statement as to the utilization of each.

5. Breakdown of mandatory construction trainees for each project which will indicate:

   a. Number of trainees required

   b. Number of trainees enrolled by race, sex and job classification

   c. Number terminated

   d. Number graduated

   e. Amount of training accomplished by each active trainee

6. A list of MBEs/DBEs contacted as possible Subcontractors, vendors and material suppliers. The type contacts made, letters, telephone calls or personal visits. The response received as a result of the contacts. What actions have been taken or proposed as a result of the response received from the DBE/MBE. What type assistance, i.e., bonding, financing, insurance, has been offered the DBE by the Contractor.

7. Quarterly DBE & WBE Progress Reports

8. Attach project **PR-1391** for each Subcontractor that has been active on the projects, if the subcontracts are less than $500,000.

The reviewing official (generally the Division EEO Officer) makes the review in accordance with **FAPG-230, subpart D**, gathers pertinent documentation in the office review phase, and makes a visual field review of construction forces in operation.

At the completion of the review an informal close-out conference may be held at the discretion of the Department of Transportation and/or the Contractor at which time any noted or suspected deficiencies may be discussed. At this time any deficiency that can't be resolved prior to the submission of the review to the Central Office (within seven days) must be addressed. If the Contractor agrees, a voluntary corrective action plan may be negotiated during the close-out conference. If he/she refuses to negotiate a voluntary corrective action plan, the Central Office will have no choice but to find him/her in non-compliance and issue a show-cause notice.

The reviewer then prepares the Alabama Department of Transportation **Form EEO-I00** substituting a company-wide **PR-1391** for the company-wide data required on the form. A narrative report is also prepared outlining the achievements and deficiencies of the Contractor and any recommendations, corrective actions, or commitment relative to the review. Specific attention should be exercised in the area of recruitment, training and DBE activities. Three copies of the entire report are then transmitted to the EEO Coordinator within fifteen (15) days of the date of the review.

The Contract Compliance Officer carefully reviews the report form, the reviewer's evaluation and recommendations, the Central Office files for the subject Contractor and his/her efforts and accomplishments, and then he/she makes an evaluation of all data considered. After a detailed discussion with the EEO Coordinator the Contractor is declared as being either in compliance or in noncompliance by the EEO Coordinator. If the Contractor is declared in compliance, no further review of the report is made in the Department of Transportation and three copies of the report are transmitted to the local FHWA Division Administrator. A copy of this transmittal letter will be sent to the appropriate Department of Transportation Division Engineer and to the Contractor.

If the Contractor is found to be in non-compliance, a copy of the report along with the EEO Coordinator's evaluation and declaration will be given to the Director of Transportation for his/her review and comments. If the Director of Transportation concurs with the EEO Coordinator's declaration, then the Contractor will be issued a "show-cause" notice in accordance with **FAPG-230, subpart D.**

The "Show-Cause Notice" will include notification (date, time and place) of a compliance conference to be held approximately fifteen (15) days from the Contractor's receipt of the notice. This conference will be held in an attempt to negotiate an acceptable corrective action plan and will be attended by representatives of the Central Office. FHWA will also be requested to attend and help in this negotiation.

If the Contractor doesn't show cause within the thirty (30) days allowed, the appropriate Federal agency will be requested to schedule a compliance hearing. In addition, the EEO Coordinator will recommend to the Director of Transportation that the Contractor be removed from the bidding list until the matter is resolved.

1:2:K:1.1 Training Program Operating Procedures

The Contractor will be paid for all adequately documented training performed on a project-by-project basis. Training payment will be made on the monthly estimate for each trainee who either terminates or graduates. Progress payments will be permitted, if requested, by the Contractor. Payment will be made at the rate of $.80 per hour trained.

Some offsite training is permissible as long as the training is an integral part of an approved training program and does not comprise a significant part of the overall training. To receive credit for offsite training, the Contractor shall contribute to the cost of the training, provide the instruction to the trainee, and pay the trainee's wages during the offsite-training period. Payment will not be made for training other than on Federal-aid projects.

The Central Office may transfer training hours from one Federal-aid project to another Federal-aid project after receipt of a written request from the Contractor and approval.

Payment will be made by the project where the training was provided unless the trainee was transferred intermittently between a number of projects. If a significant part of the total training was provided by the project where the trainee was initially enrolled, total payment may be made by this project.

Training is expected to begin as soon as feasible after the start of work utilizing the skill involved. As soon as feasible, is interpreted as approximately 10 percent of the work utilizing the skills to be trained, being completed. If the trainee has not begun work after approximately 10 percent of the work utilizing the skill involved is completed, the Project Engineer will request from the Contractor an explanation as to when training will begin. This explanation along with the Division's recommendations will be forwarded to the Central Office for evaluation. If the explanation is not acceptable, Progress payments will be suspended until the required trainees are employed. When, for some reason, a trainee is terminated and the training obligations have not been met the Contractor will immediately recruit a replacement trainee.

The **"ALDOT Trainee Enrollment/Time Report,"** in conjunction with the payroll transcript as submitted to the Project Engineer, are the basic records used to verify the Contractor's training efforts. The Project Engineer will check for completeness and accuracy of both documents to verify the information indicated. In the case of trainees working on multiple projects, the Project Engineer of each project involved should receive a copy of the monthly training report.

A monthly report assembled from all projects within the Division titled **"OJT Monthly Training Summary"** will provide pertinent information on trainees and minorities. The Division EEO Officer in accordance with established time frames will forward this report to the central office.

The Central Office will continue to establish the number of training hours per project prior to authorization by FHWA, and to approve the initial training classification before the Contractor begins work on the project. All requests for changes in training classifications after the initial approval shall be made to the Project Engineer and forwarded to the Division EEO Officer along with the Project Engineer's recommendations. The Division EEO Officer will then forward, along with the Division's recommendation, any requests for changes to the Central Office for their ultimate approval.

1:2:L CONTRACTOR ADMINISTRATION (UTILITY CONTROL)

1:2:L 1.1 General.

The Determination of utility facilities requiring relocation or adjustment and the reimbursement for the cost there of will be in accordance with the **"Alabama Department of Transportation Utility Manual",** dated October 1995. This Section of the Construction Manual is only a broad summary of the information contained in these instructions.

The **"Alabama Department of Transportation Utility Manual"** is issued by the Utility Section of the Design Bureau and is available in each Division Office. The instructions outlined within this Utility Manual will take precedence over this Construction Manual in any apparent conflict. The Project Engineer and Utility Inspector must be thoroughly familiar with these instructions in order to properly inspect and document utility relocation or adjustment work.

1:2:L:1.2 INTERDEPARTMENTAL COORDINATION

Immediately following the transmittal of plans and estimates to the Central Office those persons responsible for utility relocation work at the Division level should determine the need for coordination of the relocation work with that of the Department's Contractor. For example, it may be found to be in the public interest to have certain grading performed at a specific location to minimize the cost of installing a gas and/or water main crossing the project. It may be found that it is essential to delay relocation of a gas transmission line until the load demand is minimal, e.g., summer. These are typical examples of problems that demand coordination and are generally provided for in the special provisions of the Department's roadway contracts. It is essential that Division personnel responsible for utility relocation work maintain advance liaison with Division construction and pre-construction personnel so as to accomplish the desired coordination.

Where such coordination is provided for in the construction sequence, scope of work, and special provisions for the Department's project, the requirements are generally prepared at the Division level subsequent to the PS&E write-up. When the construction sequence, scope of work, and/or special provisions involve utilities, a copy of the requirements should be sent to the Utilities Section in the Central Office.

If the utility work is to be accomplished under a contract let by the utility owner, Division personnel responsible for utility relocation plans and agreements should inform the owner and/or engineering consultant as to the need for coordination so that this requirement can be made a part of the owner's contract documents.

1:2:L:1.3 PROJECT PRE-CONSTRUCTION AND/OR PRE-WORK CONFERENCE.

Prior to beginning work on a construction project, the Division Construction Engineer will determine a date for the pre-construction conference. The State Utilities Engineer and Division Utility Engineer are to be notified of the time and location of this meeting, if utility conflicts are involved. The utility companies should also be invited to attend. The problems of the utility companies in coordinating their work with construction of the project should be discussed in detail and, if possible, a satisfactory solution reached. If the project is of such magnitude and/or it is located in a highly developed urban area, arrangements should be made for additional utility conferences to be held as work progresses.

If utility relocation is to be accomplished prior to project letting, the Division may consider it advantageous to hold a Pre-Work Conference with representatives of the Department and Utility Companies. Those persons from the District or Project who will be responsible for insuring that facilities are relocated to proper horizontal and vertical alignment and for documentation of cost should be present

at this Pre-Work Conference. This conference should not replace the usual pre-construction conference held as part of the Department's procedures for constructing the project.

The Pre-Work Conference for utilities should serve as a means by which all persons involved can discuss coordination, daily records, general plans, etc.

1:2:L:1.4 AGREEMENTS

An agreement is the approved mechanism for relocation of existing utility facilities when changes are initiated by the Department because of proposed highway or bridge construction, or when the utility desires to construct new facilities during a highway construction project. This written agreement defines the Department's and the utility's separate responsibilities for financing and accomplishing the relocation work. The circumstances under which the Department may be liable for such costs and the method for developing the relocation costs is covered in Chapter Seven of the Departments Utility Manual. Agreements fall into several general categories which include Standard, Master, and Special agreements.

Standard Agreements

Standard agreements are those entered into by the Department and the utility addressing normal utility situations. Standard agreements are formulated by completing a set of standard forms and furnishing exhibits.

Master Agreements

A master agreement is specific for each utility and varies depending upon the individual utility's needs. Once formulated to these specific needs and approved, documentation and supporting data for individual projects are the same as for a standard agreement except that an agreement form is not necessary and the supporting information is submitted with a letter of transmittal.

Special Agreement

Special agreements are reserved for the most complex situations such as the relocation or modification of major facilities that have a zone of influence within the utility system greater than the immediate project area. The need for a special agreement will be determined by the Department's Utilities Engineer in consultation with the Department's legal counsel, the utility's engineer and the utility's legal advisor.

Agreements used by the Department can be categorized further depending on the type of utility project (retention, relocation, or new construction), the party responsible for performing the utility design and the utility construction work (the utility or the Department), and whether or not the work is reimbursable. For example, there are several common methods for performing the utility construction as illustrated by the following:

1. Utility's own forces
2. Utility's continuing contract
3. Utility's low bid contract
4. Combinations of 1,2, and 3
5. Department's highway contractor

It would be difficult to provide a single agreement form to cover all of the possible variations for reimbursement, project type, and design/construction responsibility. Likewise, it would be unwieldy to

provide a new form for each unique set of circumstances. The Department has elected to utilize a limited number of standard agreement forms. These forms are as follows:

SAHD No. 1	Non-Reimbursable Agreement	Non-Reimbursable Agreement For Relocation of Utilities on Public Right-of-Way
SAHD No. 2	Reimbursable Agreement	Reimbursable Agreement For Relocation of Utility Facilities On Private Or Public Right-of-Way
SAHD No. 3	Reimbursable Agreement Work By State	Reimbursable Agreement For Relocation Of Utility Facilities, Work to Be Accomplished By State Contractor
SAHD No. 4	Non- Reimbursable Agreement Work By State	Non-Reimbursable Agreement For Adjustment Of Utility Facilities, Work TO Be Done By State Contractor
SAHD No. 5	Retention Letter	Letter Of Retention Of Utility Facilities, No Conflict On Project
SAHD No. 6	Supplemental Agreement	Supplemental Agreement For Utility Relocation Cost
SAHD No. 12	Agreement to Terminate	Agreement To Terminate A Reimbursable Utility Relocation Agreement
MB 01 (Special)	Permit Agreement For The Accommodation of Utility Facilities On Public Right-of Way	This Form is used for normal permit actions initiated by the utility when the utility desires to construct new facilities within the limits of an ongoing Department construction project

1:2:L:1.5 <u>Prosecution of work by utility forces</u>.

Following authorization by the Division to the Utility Owner, the Division will submit **Form S.P.-3, "Utility Relocation Progress Report"** to the Central Office. This Form (which originates at the Project level) will be submitted beginning on the first of the month following authorization and continue on a monthly basis whether or not the owner has begun work, until such time as the work is completed.

If at any time it becomes evident that the utility company is not acting in the best interest of the Department, such as in pursuing completion of the work, traffic handling, or safety and the Project Engineer is unable to resolve these matters, he/she should notify his/her immediate supervisor. Should the Division be unable to determine the cause of the problem, or cannot effectively have all work pursued

and accomplished in a satisfactory manner, they are encouraged to contact the Central Office Utility personnel for assistance.

Under certain conditions the Utility Owner will contract with a Consulting Engineering firm to perform all engineering work. When this is the case, a representative of the Consultant should be on the project, and supervise the Utility Contractor in respect to the approved Utility Agreement.

The Department's inspectors should not be giving instructions or dealing directly with the Utility Contractor, but should go through the utility owner or his/her representative (which includes the approved Consulting Engineer).

1:2:L:1.6 DAILY PROJECT RECORDS.

1:2:L:1.7 Reimbursable Relocation

Reimbursement covered under **Form SAHD No. 2 "Reimbursable Agreement For Relocation Of Utility Facilities On Private Or Public Right-of- Way"** to the owner must be governed or supported by Department records compiled at the project or field level. This fact makes it mandatory that appropriate and accurate records be compiled and maintained at the project or field level by qualified personnel.

Listed below are guidelines that must be adhered to in order to properly handle reimbursable utility relocation work and facilitate processing invoices.

1. Project personnel assigned to inspection of utility relocation work should have a copy of the estimate and approved plans in their possession when performing inspection work. In addition, they should familiarize themselves with the general requirements of the Department's Utility Manual, Federal-Aid Policy Guide and 23 CFR 645 Parts A and B and Section 23-1-5, Code of Alabama, 1975, as amended. This information is available through each Division Office.

2. The inspector assigned to relocation work should complete **Form S. P. - 1** each day for each utility working on the project. In addition, the inspector should utilize utility plans or appropriate project plan sheets to show the work performed daily in contrasting pencil so as to be readily identified.

3. The inspector should be especially careful to see that the work being performed is accounted for in the previously approved plans and estimate. If not, this should be reported immediately to the inspector's appropriate supervisor and the owner's representative in charge. This applies regardless of who is performing the work, the owner's forces or a Contractor. The Department's Utility Engineer should then take appropriate action.

1:2:L:1.8 Non-Reimbursable Relocation

Record keeping at the project level for relocation and/ or adjustments covered under **Form SAHD No.1 "Non-Reimbursable Agreement For Relocation Of Utility Facilities On Public Right-Of-Way"** is not as demanding as that required for reimbursable work; however, the project records for this type work must show on a daily basis the same general information as that required for reimbursable work such as number of personnel, number and type of equipment and the location and extent of work accomplished. Any conflicts between the utility relocation and the State's Roadway or Bridge Contractor should be noted.

1:2L:1.9 Relocation by the Departments Contractor.

In some cases adjustment and/or relocation of facilities, such as water lines, sanitary sewers, manhole covers, and valve boxes will be included in the Department's contract with the Roadway or Bridge Contractor. **Form SAHD No. 3 "Reimbursable Agreement For Relocation Of Utility Facilities**

On Private Or Public Right-of-Way, Work To Be Performed By State Contractor" is used when the utility is to be compensated for all or part of the costs, including inspection by utility owner, involved in the relocation.

Form SAHD No. 4 "Non-Reimbursable Agreement for Relocation of Utility Facilities on Public Right-of-Way, Work To Be Done By State Contractor" is used when the utility is required to relocate said facilities at its own expense. Under this agreement the utility will reimburse the Department for the costs involved in the relocation. Documentation for payment of utility adjustment items included in the Department's contract will be the same as any other contract item. This will include daily entries of work accomplished in the daily inspector's report, daily field measurements placed in field books and, if appropriate, sketches and notations on construction plan sheets or separate cross section sheets. Payments for adjustments covered under either of these agreements will be made directly to the Department's Contractor on his/her monthly estimate.

1:2L:1:10 <u>Importance of Documentation.</u>

Complete and thorough documentation of utility adjustments made by the utility company or their Contractor is not only mandatory from a payment standpoint, but also from the standpoint of providing documentation of possible claims submitted by the Department's Roadway or Bridge Contractor for delays in construction due to utility conflicts. In most cases, where the utility company performs utility adjustments, the adjustments will still be underway when the Department's Roadway or Bridge Contractor moves on the project. In these situations, it will be very important that the Project Engineer and inspectors clearly document any conflicts between the Contractor's operations and the utility adjustment each day. Project diaries and inspector's reports should detail all operations and areas of work available to the Department's Contractor, even though utility adjustment may be conflicting in one specific area. In some cases, photographs may be appropriate to adequately document conflicts and/or available work areas. Any formal meetings held between Department personnel, utility representatives and the Department's Contractors should be documented with a "Memorandum to the File" with copies to all parties in attendance. This type documentation may seem unnecessary at the time, but will prove immeasurable in the evaluation of later claims submitted by the Contractor.

In many cases, utility adjustments by the utility companies will begin prior to the contract letting by the Department. For these situations, it will be mandatory that the Division Utility Engineer has a clear understanding with all utility companies operating within his/her Division regarding contact with him/her prior to beginning adjustments. Information as to the status of right-of-way acquisition, and/or right of entry for the purpose of utility relocation may be made known at this time. Since Project personnel will not be readily available for inspection duties prior to contract letting, the Division Utility Engineer, after being contacted by the Utility Company, must then contact the District Engineer and/or Project Engineer to arrange for adequate inspection of the adjustment work.

1:2:L:1.11 <u>Changes in Plans and Estimate for "Force Account Work"</u>

During construction, conditions affecting the work may be encountered which were not anticipated during preparation of the estimate and plans. These may require specialized equipment and personnel; however, in all instances where the work is being performed by "force account" method and the owner desires to use equipment and personnel which were not included in the approved estimate, plans and agreement, such changes must be approved by the Central Office in Montgomery.

This applies also in instances where the owner may wish to assign or sublet to others such specialty items as blasting, X-ray work, and the like. To secure approval of the Central Office, the owner must demonstrate by some tangible means such as solicitation of bids, continuing contracts and the like, that

the prices of such work are reasonable and would be used in its own operation. Solicitation of bids or prices in emergency situations may be handled by telephone and confirmed in writing.

1:2:L:1.12 Changes in Plans and Estimate for "Contract Work".

In the matter of changes in work being performed by the Utility's Contractor which reimbursement by the State to the owner is expected, all changes must be cleared through the Central Office. As a general rule, this should be handled under a change request executed by the Contractor and owner and a supplement to the previously approved estimate and agreement. Handling this type of negotiated price is very similar to that normally exercised by the Department of Transportation when entering into a supplemental agreement and change request with a Roadway or Bridge Contractor.

Emergency situations will arise on some occasions that will require expeditious changes in plans. Good advance planning by the owner and the State will minimize these. Such changes must also be cleared with the Central Office. This can be handled by telephone and confirmed in writing. **(Refer to Utility Manual, Chapter Six -Construction.)**

1:2:L:1.13 Invoices (Furnished by the Utility Company)

The original and six copies of the invoice along with **Form S.P.-4,** "Statement of Charges"(notarized with seal affixed) attached to each copy of the invoice must be submitted to the Division. The Division through the Project Engineer, Division Utility Engineer, and Division Engineer will check the invoice against the project records, provide original signatures, and prepare the "invoice check sheet" prior to forwarding to the Central Office Utilities Section.

It is most important that the invoice be prepared in such form as to enable persons making the review to properly relate or compare the invoice to the approved estimate.

The Division should return invoices that contain items not shown in the approved estimate or supplements thereto to the owner for correction.

The invoices covering work let to contract by the owner must be accompanied by the Contractor's monthly claim for reimbursement. This is generally referred to as the "Contractor's monthly estimate". This monthly estimate must carry the endorsement of both the Contractor and the owner.

When each utility has completed its reimbursable work, the Division should request the owner to submit its claim for reimbursement (invoice) at the earliest time possible. If the claim is delayed more than 60 days following completion, the owner should be reminded then and from time to time that the reimbursable agreement provides that complete and final billing shall be submitted within six months.

Invoices may include charges for work accomplished by a combination of forces provided each category is clearly identified and the invoice properly supported.

In summary, the Department's project records must be compatible with the owner's daily records and more particularly the Department's daily records must support the owner's invoice for reimbursement. A comparison of records by the Utility Company representative and the Project Inspector should be made daily with signatures as provided on **Form S.P.-1**.

There are only two owners with which the Department has had experience that causes these owners to be considered "Special Cases". These are Alabama Power Company and Bell South Telecommunications. The sophisticated or complex accounting systems used by these two owners cause this.

Alabama Power Company

A memorandum of Understanding dated January 31, 1974 is available in each Division Office. This memorandum carries the approval of Alabama Power Company.

If there is conflict between the Memorandum of Understanding dated January 31, 1974 and the remainder of the instructions, comments, regulations, etc. contained herein, the contents of the Memorandum of Understanding shall have priority but only where Alabama Power Company is involved.

Bell South Telecommunications

Invoices submitted by Bell South Telecommunications will frequently contain an item "Other Materials". "Other Materials" consist of nuts, bolts, screws, nails, etc. that are not generally identified in the cost estimate or invoice. This is comparable to "Miscellaneous" materials as used or defined by other owners.

This expenditure is a percent factor and the final cost can best be determined on audit. The Department's personnel should not reject an invoice due to this item so long as it appears to be reasonable. Where there is reason for concern, the Utility Section of the Central Office should be contacted for guidance.

SUMMARY.

Whether utility adjustments are performed by the Department's Contractor or by the Utility Companies, Project personnel responsible for inspecting utility work should assure themselves of the following:

1. Proper documents are on file to cover the adjustment work.

2. The grades and locations of the adjusted facilities will clear all roadway and bridge construction.

3. All adjustments are performed in accordance with the Specifications and Contract Agreements. Adjustments in areas to be paved must have proper compaction.

4. Adequate documentation for reimbursable work is maintained and diaries complete for proper analysis of any delays or conflicts.

1:2:M Contract Administration (Project Diary & Inspector's Daily Reports).

1:2:M:1.1 Project Diary

A project diary will be required for each construction project. This diary will be prepared in ink and include a summary of all work conducted by the Contractor and engineering personnel, special instructions to the Contractor, equipment on the project, working days charged, visitors to the project, etc. If an error is made while posting the diary, the error will be lined through and initialed by the individual posting the diary, and then the proper entry will be made. At no time will erasures or paper correction fluid (White-Out) be used to correct an error.

Of all records kept by the Project Engineer and his/her staff, none is more important than the daily record of activities on a project. While the Project Diary is not to be used primarily as a construction detail book, it should carry sufficient construction data to verify the construction records kept in the Inspector's Daily Reports and other record books. A detailed description of each construction operation is not necessary since this information is shown in the Inspector's Daily Report.

A properly kept Project Diary is invaluable to the Project Engineer and to the Department. Primarily, the Project Diary should be a record of administrative details, working conditions, and personnel on the work performed, but a well kept Project Diary also should contain information as to special instructions given the Contractor as well as an accurate record of happenings on the project which cannot be considered normal.

The Project Engineer should keep a complete record of special instructions to the Contractor, with names of witnesses and Contractor's representatives involved, especially those dealing with phases of work over which some controversy has developed or may develop. Sound judgement and foresight should be employed because that which may seem to be an insignificant instruction or incident today may develop into a major controversy or lawsuit against the Contractor or the Department at some later date. An accurate documentation of events can contribute heavily towards the resolving of an issue.

The Project Diary sometimes becomes a court exhibit in litigation by Contractors or property owners regarding claims. Each entry should be made with the thought in mind that it may someday be a legal instrument that will substantiate a just claim or disprove an unjust one.

The Project Diary must be complete with an entry made each day throughout the life of the contract. Particular attention must be given to the controlling item or items of work in effect, and to the working conditions on these items. The controlling item(s) shall be identified <u>each</u> <u>day.</u> Rain gages should be installed on the project site to document daily rainfall. When time is not charged due to rain the amount of rainfall should be documented. On weekends and holidays when no work is being performed the rainfall for the weekend and holiday period should be recorded. It will not be necessary to document rainfall during periods of work suspension under Article 108.07. When a day is not charged for Recovery the diary should show the controlling item(s) involved in Recovery, the location of the work on the project, and the time of day that work was restored. The Contractor's personnel and equipment, the hours worked, etc. must be placed in their proper spaces in the book. Any day on which there might be a question concerning time charges, there must be a full discussion as to the reason for charging or for not charging a working day. Construction progress is determined by comparing the total dollar value of work performed versus the original contract plus any quantities of work added by supplemental agreements. The adequacy of the Contractor's work force and equipment is of vital concern. The Project Engineer should indicate each day whether in his/her opinion progress is satisfactory or unsatisfactory. Record all conferences of consequence with the Contractor or his/her representatives regarding safety requirements, labor conditions and EEO Activities.

On smaller projects, it may be possible for the Project Engineer to complete the Project Diary as he/she oversees construction work during his/her normal visits to each operation in progress during the day. For larger projects, office personnel will generally be responsible for completing the Project Diary from a review of each daily inspector's report. If office personnel complete the Project Diary, it is

suggested that the Project Engineer maintain a personal project diary in which he/she describes first-hand conversations and instructions to the Contractor, utility companies, etc. In either case, the Project Engineer should review all daily inspector's reports and the Project Diary. After review he/she should add any additional comments which are necessary to adequately describe all operations, instructions and conversations. The Project Engineer should then place his/her signature at the conclusion of each daily entry

1:2:M:1.2 Inspector's Daily Report

To assist the Project Engineer in recording the proper information in the Project Diary, each inspector is required to prepare an Inspector's Daily Report **(Form BC-1O1)** describing in full the daily activities on the work which he/she inspects. (See the example of a properly prepared Inspector's report in this manual). This report is to be used as a backup document for specific details to support the project Diary. The original copy of the Inspector's Daily Report is to be filed and made a part of the permanent documentation for the project, with the carbon copy of this report being retained by the Inspector.

Each person or ranking individual in the case of multiple inspectors inspecting a specific Contractor's operation will fill out and file in the project office an inspector's daily report. In addition to the inspectors, the Survey Party Chief will fill out a report listing all items mentioned below. Other personnel such as Assistant Project Engineers, Chief Inspectors, etc., should also complete a daily inspector's report.

Listed below are some of the items, which should be covered, in the daily report:

Inspectors.

1. Date; weather; Department personnel and hours worked by each, forces and equipment worked by the Contractor. Reasons, such as "not needed, no operator, broke down, etc." should be given for any idle equipment.
2. Detailed explanation of work in progress (location by stations).
3. Any instructions to the Contractor, or requests from the Contractor, including inspectors answer.
4. Instructions from District, Division or Central Office personnel.
5. Any errors found in plans or made by Survey Party and how they were corrected.
6. Work on the project that is available but is not being performed by the Contractor due to lack of personnel or equipment.
7. All discussions with property owners.
8. All discussions with Utility Companies.
9. All samples taken, checks made (spacing of steel, widths, depths, etc.).
10. General comments on operations inspected.
11. All visitors and their comments concerning items for which the inspector is responsible.

Party Chief.

1. Date; weather; Department personnel and hours worked by each.
2. Work performed by Survey Party, including type work and location of work by station numbers.
3. Requests for stakes by the Contractor, including who requested them and at what time. Also explain what answer was given the Contractor, (i.e. we'll start on them at 1:00 p.m., cannot get to them until tomorrow, etc.).
4. Any time stakes have been destroyed by the Contractor, it should be noted when replacement stakes are set with an accurate record of personnel working and their time on this work.
5. A record of all instructions given the Contractor concerning stakes. Also a copy of cut sheets, slope stake sheets, pipe or culvert layouts, etc. to the Contractor should be retained and filed in the project files.
6. Instructions received from the Project Engineer, District, Division or Central Office personnel.
7. Any discussion with property owners.

8. All delays in staking attributed to the Contractor, such as Contractor requesting a pipe to be staked and upon arriving at the site it is found that the fill has not been built as required; or cross-sections are requested on a borrow pit and it is discovered the entire pit has not been cleared.

9. Any general comments the Party Chief has concerning any aspect of the survey work and its relation to the overall completion of the project.

Assistant Project Engineer

1. Items of work or personnel he/she reviews.
2. Any instructions given or received.
3. Coordination of stakeout, inspection, sampling, testing, etc. to obtain maximum performance from the State personnel.
4. All discussions with property owners, utilities, local public officials, etc.
5. Requests by the Contractor and answers to these requests.

Any general comments related to progress on the job, disagreements with Contractor personnel, Department of Transportation personnel problems or any other items, which could have an affect on completion of the project.

1:2:N CONTRACT ADMINSTRATION (CONTRACTOR CLAIM PROCEDURE).

In the event a situation arises whereby the Contractor deems that extra compensation is due him/her for work or materials not clearly covered in the contract and not ordered by the Engineer as extra work, the Contractor may file a claim as noted in Section 110 of the Standard Specifications. The following procedure has been formulated to facilitate the prompt settlement of such claims.

The Contractor, in accordance with Article 110.02, shall notify the Project Engineer in writing, with a copy to the State Construction Engineer, of his/her intention to make claim for extra compensation prior to beginning work on the disputed item. The written notice of intent shall be furnished to the Engineer prior to the time the contested work is started. Oral notification by the Contractor and confirmed in writing by the Contractor, within three calendar days, will be accepted as complying with this requirement. The written notice of intent shall set forth the reasons the Contractor believes additional compensation will be due, the nature of cost involved and insofar as possible the total amount of the claim.

After notification of intent to claim, the Project Engineer should meet with the Division Construction Engineer to discuss the type documentation that is to be kept. The Project Engineer shall keep accurate records of the Contractor's labor, equipment and materials expended on the disputed work. Documentation of these items should be assembled and recorded in a Force Account format. This information will be essential to the analysis of the claim after it is submitted to the Department for consideration. Once the work has begun the Project Engineer shall meet with the Contractor's representative on a weekly basis. At this meeting, normally on Monday or the first work day of the week, the project engineer will receive the daily records kept by the Contractor for the previous week. After work on the item(s) in question has been completed, the Contractor shall, within 90 calendar days, submit to the Project Engineer six copies of his/her completely documented claim. In order to verify that the required claim documentation package is complete the Contractor's attention should be directed to Article 110.06. After receipt, the Construction Bureau and the Division will review the claim. After the joint evaluation and within 90 calendar days, the Contractor will be notified of the Department's decision on the claim.

If the Contractor does not accept this decision, he/she may request to make a presentation to the Claims Committee. This written request, along with six additional copies of the documented original claim shall be made to the Project Engineer, by certified mail, within 30 calendar days from the date of the department's response.

The Claims Committee is composed of four departmental employees, appointed by the Director, who were not involved in the design or construction of the project.

For Federal Aid projects the Director will advise the Federal Highway Administration of the time, date, and location of the hearing, and will invite the FHWA to send an observer.

The Contractor and his/her representatives will be invited to a mutually convenient Committee meeting, along with the Transportation Department employees having pertinent knowledge relative to the specific claim under consideration. The meetings will normally be conducted as follows:

1. The Contractor or his/her representatives will be given an opportunity to present the claim, and respond to any questions that may arise.

2. The Transportation Department representatives will then be allowed to present information and documentation, which supports their action on the claim.

After all documentation has been received and reviewed by the Claims Committee, the Committee will make a written recommendation to the Transportation Director.

After his/her review, the Director will advise the Claims Committee chairman of his/her decision on the claim. The committee chairman will then advise the State Construction Engineer who will then report the decision to the Division. The Division in turn will, by certified mail, notify the Contractor.

If the Contractor does not accept the decision of the Director, he/she may request to make a presentation to the Claims Appeal Board. The Claims Appeal Board shall consist of three primary members, who are normally appointed for a two-year term. A three member pool of alternates are chosen from which a substitute can be provided in the event a regular member is unable to attend or a position is declared Vacant by the Director. One primary and one alternate shall be chosen by the Director, one primary and one alternate chosen by the Alabama Road Builders Association, and one primary and one alternate are jointly selected by the Director and Alabama Road Builders Association. The jointly appointed primary member will be the board chairman. The jointly appointed alternate member will be the alternate Board Chairman. At least two Board Members must be registered Professional Engineers in the State of Alabama. Members may not be a current employee of either the Contractor or the Department, nor may any member have been connected with the project to be considered. The cost of compensation and expenses of the Claims Appeal Board members shall be shared equally by the State and the Contractor. The report and recommendations of the Claims Appeal Board to the Director will not bind the Director to approve their recommendations.

The Contractor, within 30 calendar days from the date of the Directors decision on the recommendation of the Claims Committee, may initiate with the Director, by certified mail, a request for a Claims Appeal Board presentation

The Board presentation will convene at the mutual convenience of the Board, the Department, and the Contractor. The Department will provide Board members copies of the original claim, the Claims Committee report, the Director's response, the issues to be examined and the documentation to be presented. The Board will not hear issues beyond the original claim.

For Federal Aid projects, the FHWA will be invited to send an observer.

The written recommendation of the Board will be sent to the Director following the presentation. The Claims Appeal Board's recommendation may be accepted, modified, or denied by the Director. After receiving the recommendation of the Claims Appeal Board, the Director has 45 calendar days to report his/her decision to the Contractor.

The Director's decision in the resolution of all claims shall be final. After the Director makes the final ruling on a claim, a supplemental agreement shall be processed to make payment for any amount deemed payable by the Director.

1:2:O CONTRACT ADMINISTRATION (ENVIROMENTAL PROCEDURES)

The Environmental Technical Section (ETS) of the Design Bureau has the responsibility to conduct or coordinate environmental studies for the Alabama Department of Transportation. The depth of these studies is dependent upon the type of action to be taken by the Department. One of the following types of documents will be prepared for each federal aid project.

1. The document requiring the least amount of studies is the Categorical Exclusion (CE). This type of document is used for categories of projects such as bridge replacements and other minor projects that do not pose significant impacts to the environment.

2. The second document is the Environmental Assessment (EA). It is prepared for projects that are not in the CE categories. These projects are usually of greater magnitude and require more planning. The final document for this is the Finding of No Significant Impact (FONSI)

3. The third type of document is the Environmental Impact Statement (EIS). It is prepared for projects that will have significant impacts upon the human environment. These are usually large projects that require considerably more planning and studies than the previous documents.

These documents are the result of input from various Alabama Department of Transportation bureaus and divisions, local agencies, federal agencies, as well as citizens who may have some interest in a particular transportation project. Once these documents are prepared and have received concurrence, they are distributed to the various Alabama Department of Transportation bureaus that will be involved with the project (ex. a new bridge would warrant a copy to the Bridge Bureau). Also, five copies are sent to the division or divisions where the construction activity will take place. The Bureau of Materials and Tests always gets a copy of the document, as they are responsible for insuring the environmental considerations have been identified and dealt with accordingly.

Prior to the beginning of any construction activities, the Final environment document and it's reevaluations should be thoroughly reviewed for identification of any specific or special environmental problems or features that are to be considered and handled during construction. The Final EIS also includes a copy of all comments received on the Draft EIS and the Transportation Department's proposed disposition of these comments. Erosion, noise, air, water, waste disposal, archaeological sites, natural or man-made landmarks, historical sites, recreational areas, and wildlife are the main environmental areas of concern during construction. Specific requirements for handling anticipated problems in each of these areas might be included as a part of the contract and thus become the responsibility of the Contractor. These areas should be constantly checked and monitored throughout construction. The following are some of the major requirements for environmental considerations in these areas:

1. WATER QUALITY AND EROSION CONTROL

Soil erosion during construction will perhaps be the major and most frequently encountered environmental consideration. The Engineer will insure compliance with all provisions of the ALDOT Standard Specifications and special provisions (specifically Sections 651 through 665 and Section 107.13) pertaining to soil erosion and prevention. In addition, all local, state (other than highway) and federal laws, regulations, and requirements will be complied with. Permits may be required in certain waterways and/or wetlands The Project Engineer should refer to the Environmental Document, Contract or Plans for specific or special erosion control features or water quality standards that may be required beyond normal specifications and requirements.

2. ARCHAEOLOGICAL SITES

Review the Environmental Document, re-evaluations and Plans to determine if any archaeological sites within the construction limits were identified during environmental studies. If a site is identified in the EIS or on Plans, the appropriate agency (as indicated) should be notified for salvage operations prior to construction. If no site or potential site has been previously identified, construction operations may begin. However, should any unknown archaeological evidence be revealed, construction operations will be stopped, and the Environmental Technical Section of the Department, or as shown in the environmental document, should be notified. The Department's ETS can determine the significance of any find and if salvage operations will be required. Construction operations may begin after the Alabama Historical Commission is satisfied that the project will not impact the site significantly or remedial actions have been taken to mitigate the Archaeological site. The laws pertaining to archaeological sites are the 1969 National Environmental Policy Act, the Antiquities Act of 1906, the Historic Sites Act of 1935, the Reservoir Salvage Act of 1960, and the National Historic Preservation Act of 1966.

3. HISTORICAL SITES

In most cases, any significant historic site or structure will be identified in the Environmental Document, reevaluations, plans, or accompanying Section 4(f) Statement. Therefore, review these documents to determine if a site is involved. The Environmental Document in most cases, accompanied by a Section 4(f) Statement, if involved with a historic site or plans, will indicate the procedures to be followed relative to relocation or salvage.

Involvement with a historical site or structure will, according to type, location, et cetera, require any number of different procedures to be followed; therefore, the Environmental Document will indicate procedures and measures to be taken (as well as construction plans) or will require consultation or coordination with the Alabama Historical Commission, U. S. Department of Interior or U.S. Advisory Council on Historic Preservation. Should any unknown or unidentified historic site be revealed during construction operations, the Alabama Historical Commission should be notified for determining the significance.

4. NATURAL OR MAN-MADE LANDMARKS

The Environmental Document, plans, or Section 4(f) Statement will identify the most significant landmarks including, but not limited to, benchmarks, section corners, significant property corners, large or rare species of trees, earth or rock formations, et cetera. The EIS will indicate the procedure for preservation or relocation. The landmarks should be relocated according to local, state and federal laws and regulations.

5. RECREATIONAL AREAS

In most cases, the Environmental Document will be accompanied with a Section 4(f) Statement if recreation areas or parks are involved with the project. A review of all environmental documents and statements will indicate the involvement and procedures to follow during construction.

6. WILDLIFE

During construction, measures will be taken in areas where wildlife is concentrated to minimize disturbance or destruction of nesting and feeding areas. The Environmental Document or plans will indicate any unusual or special procedures to follow in minimizing harm, which may include scheduling of work to avoid disturbance, possible termination of work until after breeding or nesting season, possible relocation of rare or endangered species encountered, et cetera.

7. AIR

During construction, there will be some unavoidable air pollution; primarily particulate matter from fugitive dust, open burning and mechanized equipment exhaust emissions. While this pollution cannot be eliminated, exercising proper care and control can significantly reduce it.

Control of fugitive or construction dust will be in accordance with local, state and federal regulations, as well as permit provisos issued by the Alabama Department of Environmental Management (ADEM) in accordance with Admin Code "R" 335-3.

Open burning will be done under the provisions of Admin. Code "R" 335-3-.01 issued by ADEM. Open burning must also comply with applicable local, state and federal laws and regulations. Attention is directed to Articles 107.13, 107.21 and 107.22 of the Standard Specifications. Copies of the Air Pollution Control Guidelines are available in each Division Office as previously submitted to them by the Bureau of Construction through Construction Information Memorandum.

8. WASTE DISPOSAL

Land clearing waste and construction and demolition debris will be disposed of in accordance with state, local and federal solid waste regulations. Plans of disposal procedures should be submitted to the local (if applicable) and state agency responsible for approval. If construction and clearance wastes are to be deposited at a city or county disposal site, it will be in accordance with the solid waste program rules. Waste will not be placed in a disposal site, which is in violation of state and local regulations. Attention is directed to Subarticle 201.03(e) of the Standard Specifications.

9. NOISE

Volume 39 of the Federal Register gives the permissible noise exposures that are allowed during construction. Should these levels be exceeded, protection against the effects of noise exposure should be provided.

Noise levels should also be consistent with any other federal, state, and local regulations and/or laws.

10. Securing Material from Pit Sources

Section 106 of the National Historic Preservation Act has necessitated that the Department obtain Archaeological and Historical clearance on material pits used in the construction of Federal-Aid projects. Section 106.01(c) of the Departments Standard Specifications requires that the Contractor obtain all mandated clearances and permits prior to entering and operating a material pit.

1:2:P CONTRACT ADMINISTRATION (TRAFFIC CONTROL PROCEDURE)

STATE OF ALABAMA DEPARTMENT OF TRANSPORTATION

SUBJECT: TRAFFIC CONTROL THROUGH CONSTRUCTION WORK ZONES

SECTION:

I. INTRODUCTION
II. DEFINITIONS
III. IMPLEMENTATION
IV. TRAINING
V. PROCESS REVIEW AND EVALUATION
VI. COORDINATION WITH THE HAZARD ELIMINATION SAFETY (HES) PROGRAM

I. INTRODUCTION

This document, known as the Procedure for Traffic Control through Construction Work Zones, is prepared in compliance with the U.S. Department of Transportation FAPG, 23 CFR 630J, issued under the authority of 23 U.S.C. 105, 106, 109, 115, 315, 320, and 402(a), 23 CFR 1.32; 49CFR 1.48(b) and the federal Hazard Elimination Safety Program, 23 U.S.C., sections 130, 144, 152, and 409 and implementing regulations. A copy of 23 CFR 630 Subpart J is included as a reference (Attachment No.1).

This Procedure may also serve as a guideline for use by the Department for other construction and maintenance activities.

Part VI of the Manual on Uniform Traffic Control Devices and associated supplements and handbooks such as ATSSA's Quality Guidelines for Temporary Traffic Control Devices sets forth basic principles and prescribe standards for the design, application, installation, and maintenance of the various types of traffic control devices for highway and street construction, maintenance operations, and utility work. These manuals are not intended to address in depth the variety of situations that occur in providing traffic control in work zones. Although those responsible for traffic control and work area protection have attempted to develop some guidelines and measures, a coordinated and comprehensive effort to develop greater uniformity is desirable. It is the intent of this document to provide these guidelines and assist in the MUTCD being properly implemented.

II. DEFINITIONS

Wherever the following terms or abbreviations (or pronouns in place of them) are used in the document, the intent and meaning shall be interpreted as follows:

ALABAMA DEPARTMENT OF ECONOMIC AND COMMUNITY AFFAIRS LAW ENFORCEMENT TRAFFIC SAFETY DIVISION - The office constituted under the laws of Alabama for administration of comprehensive state and local highway and traffic safety programs to reduce traffic crashes, deaths, injuries, and property damage within this state.

AUTAR – Alabama Uniform Traffic Accident Report.

ATSSA - American Traffic Safety Services Association.

CONTRACTOR - The individual, partnership, firm, corporation, or any acceptable combination thereof, contracting with the State for performance of prescribed work.

DEPARTMENT - Alabama Department of Transportation (ALDOT), as constituted under the laws of Alabama for administration of highway work.

DIRECTOR - The chief executive officer of the Department as created by law, also referred to herein as Transportation Director.

DIVISION - An engineering organization of the Department in a geographical area of the State charged with all functions of the Department as related to its respective area.

DIVISION ENGINEER - The engineer in charge of a designated Division of the Department.

FAPG - Federal-Aid Policy Guide.

FHWA - Federal Highway Administration.

HAZARD ELIMINATION SAFETY (HES) PROGRAM - ALDOT Safety Program using Federal Safety Funds (Section 152) to identify high crash locations and develop counter measures for improvement using cost-benefit analysis procedures within budget limitations.

LEAD BUREAU - The Bureau or Division within the Department which is responsible for the preliminary engineering project.

MULTIMODAL BUREAU - The Bureau charged with administration of the Hazard Elimination and Safety Program pursuant to 23 U.S.C., Sections 130, 144, 152 & 409 and implementing regulations.

MUTCD - Manual on Uniform Traffic Control Devices for Streets and Highways, published by the U.S. Government Printing Office.

NHI - National Highway Institute.

NHS – (National Highway System) - Consists of the Interstate System and other designated major state routes.

PLAN-IN-HAND - The field inspection and plan review of a project made jointly by Departmental personnel to assure accuracy and correctness of the plans prior to the PS&E inspection.

PS&E- (Plans, Specifications, and Estimate Field Inspection) - The field and plan review of a project made by the Department, and FHWA on full oversight projects, to assess correctness of the plans, the specifications, and the preliminary estimates prior to submission of the PS&E plan assembly.

PROJECT - The specific section of the highway together with all appurtenances and construction to be performed thereon under the contract.

PE - (Project Engineer) - The engineer in charge of a designated project.

PTCI - (Project Traffic Control Inspector) - The person designated to be responsible for reviewing traffic control devices on a particular project.

STATE - State of Alabama.

STATE TRAFFIC OPERATIONS ENGINEER - The engineer in charge of traffic engineering, traffic control, and traffic control devices for the Department.

TCP - (Traffic Control Plan) - A plan that describes Temporary Traffic Control (TTC) measures to be used for handling traffic through a specific highway or street work zone or project.

WORK ZONE – an area of highway with construction, maintenance, or utility work activities.

WORK ZONE CRASH – a traffic crash in which the first harmful event occurs within the boundaries of a work zone or on an approach to or exit from a work zone, resulting from an activity, behavior, or control related to the movement of the traffic units through the work zone.

WORK ZONE IMPACTS – work zone-induced deviations from the normal range of transportation systems safety and mobility. These impacts may extend beyond the physical location of the work zone itself and may occur on the roadway on which the work is being performed as well as other highway corridors.

III. IMPLEMENTATION

A. Design

1. Traffic Control Plan (TCP)

a. Traffic Control Plans may vary in scope from a very detailed plan designed solely for a specific project, a reference to standard plans, a section of the MUTCD, or other standard highway agency manual. The degree of detail in a TCP will depend on factors including, but not limited to, project complexity and relationship of traffic with construction activity.

b. The scope of the TCP shall be determined prior to the plan-in-hand inspection once the sequence of construction is considered firm. The TCP will consider, but will not necessarily be limited to, the following items:

(1) Signing.

(2) Maintenance standards for traffic control devices.

(3) Worker protection/safety.

(4) Minimizing delays and economic impacts to traffic.

(5) Construction scheduling and hours of work.

(6) Application and removal of pavement markings.

(7) Flagging.

(8) Use of pilot cars.

(9) Methods and devices for delineation and channelization.

(10) Placement and design of barriers and barricades.

(11) Storage of equipment and materials.

(12) Removal of construction debris.

(13) Geometrics of detours.

(14) Access for emergency vehicles.

(15) Clear roadside recovery areas.

(16) Provision for disabled vehicles.

(17) Roadway lighting.

(18) Movement of construction equipment.

(19) Length of project under construction at any one time.

(20) Methods of minimizing construction time consonant with safety.

(21) Speed limits and enforcement.

(22) Surveillance and inspection.

(23) Modification of the above-noted items as well as any other related ones under conditions of darkness or inclement weather.

(24) Coordination of construction with adjacent projects.

(25) Congestion/Incident management techniques.

(26) Utility relocations.

(27) Public Awareness Programs.

c. TCPs shall be developed for all projects and be included in the plans, specifications, and estimates and shall be consistent with Part VI of the MUTCD.

d. FHWA review of the TCP on full oversight projects will be made from preliminary plans furnished for use on the PS&E field review.

e. FHWA comments pertaining to the TCP will be considered and handled by the Lead Bureau in the same manner as other comments made on the PS&E inspection.

f. The construction plans should provide a unit pay item for each traffic control device, which may include the furnishing, installation, proper maintenance, and relocation as required throughout the duration of its use on the project.

B. Construction

1. General

After a project is placed under contract, the Contractor may be permitted to develop a TCP to be used in lieu of the TCP provided in the construction plans. The Contractor's plan will be approved for use only if the Department and FHWA find that the Contractor's plan is as good as or better than the plan provided in the construction plans. The Contractor may also be permitted to offer a revision to only a portion of the existing TCP. To receive approval for changes to the TCP, the Contractor must submit a detailed alternate plan, or revision, to the Division Engineer, through the Project Engineer.

The Division Engineer shall submit the proposed revisions, along with recommendations, to the State Construction Engineer for review and approval and further handling with FHWA.

The Contractor will not be permitted to implement any part of an alternate plan, or revision, until written approval has been given by the Department.

For proposed TCP revisions initiated by Department personnel, the PE shall submit the revision to the Division Engineer. The Division Engineer shall submit the revision, along with recommendations, to the State Construction Engineer for review and approval and further handling through FHWA.

The PE may approve minor TCP changes for immediate implementation as deemed necessary.

2. Project Traffic Control Inspector

Before work begins on a project, the PE shall designate, in writing, a qualified person to be responsible for reviewing the traffic control devices on the project. This person shall have received training as provided by Section IV and shall be known as the Project Traffic Control Inspector. The PTCI shall report to the PE and have the principal duty of keeping the PE informed of the adequacy and effectiveness of the traffic control devices on the project. The PE may serve as the PTCI.

All traffic control devices should be inspected prior to installation for compliance with plans and specifications. The PTCI shall inspect the installation of the devices and make regular inspections of the in-place traffic control devices to determine if they are being properly maintained. The PTCI shall document each inspection by completing, Form C-25, Daily Inspection of Traffic Control Devices. The PTCI shall also perform periodic nighttime inspections to confirm that proper maintenance is being performed on the devices. These nighttime inspections shall also be documented on Form C-25. The Form C-25 shall be submitted to the PE for review.

The PTCI should confirm that the Contractor has covered or removed all traffic control devices that are not applicable or no longer needed. Pavement edge drop-offs greater than three inches should be noted and the need for the Contractor to perform corrective shoulder work should be noted.

The PE will be responsible for notifying the Contractor of any deficiencies and administering the contractual enforcement requirement. Dates of such notification and dates of corrective action by the Contractor should be noted on Form C-25.

3. Contractor Liability

This Procedure does not relieve the Contractor of the prime responsibility to continually inspect and maintain the traffic control items and to safely handle traffic through the work area. The Contractor is responsible for traffic safety on the project. The Department's responsibilities are limited to identifying acceptable control levels and taking measures to effectively enforce contract provisions. The Contractor's responsibilities shall not be relieved by the Department's failure to enforce any provision.

4. Assistance from Local Law Enforcement Officers

The PE should establish a cooperative relationship with the law enforcement agency responsible for traffic crash investigation. The PE should request to be notified of all traffic crashes that occur within the project limits. The PE should also be aware of any agreement with the Department of Public Safety concerning the use of State Troopers on construction projects. When needed, arrangements should be made through the Division Construction Engineer's office for Trooper assistance with traffic handling and speed control through the construction project.

IV. TRAINING

Training on temporary traffic control in work zones appropriate to the job decisions each individual is required to make will be offered periodically. Training may include the need for traffic safety, traffic control planning, quality standards for traffic control devices, and training in application and techniques utilized and prescribed by the MUTCD. Training should also include human factors, proper attire, attitude, and appearance of workers.

V. PROCESS REVIEW AND EVALUATION

A. Project Review

1. Crash Evaluation

The PTCI will report all known work zone crashes to the PE. The PTCI will review the circumstances involved in the crash and, if immediate changes in traffic control are warranted, will recommend those changes to the PE. Subsequently, the PTCI shall complete Form C-25A, Crash Report, and should obtain AUTARs from the appropriate law enforcement agency. This information, as well as information required of the Contractor by Subarticle 107.14(c) of the Standard Specifications, will be used for Departmental purposes only to evaluate the TCP consistent with Sections I and VI of this Procedure.

2. Crash Reporting

The PE will submit the documentation gathered/compiled for each work zone crash, including any additional comments, to the District and Division offices for review as soon as possible following the crash. The Division Engineer shall forward a copy of the information to the State Construction Engineer and to the State Traffic Operations Engineer.

The State Traffic Operations Engineer may further review the information and submit a copy of the report with recommendations or comments to the State Construction Engineer and the State Design Engineer. The State Design Engineer may distribute TCP improvement recommendations to all offices within the Department having responsibility for preparation and/or review of TCPs.

3. Field Observations

During the daily course of work, all Project personnel will be observant of the work zone for the purpose of identifying work zone impacts and, when possible, taking action toward the alleviation of those impacts. Observations may include occurrences of vehicular congestion, pedestrian impediments, hindrances to emergency vehicles, and crash patterns. Actions to alleviate these impacts may include modification of the traffic control plan in accordance with III B 1. of this Procedure, adjustments to the contractor's operations, or other changes as deemed appropriate.

These observations will be documented in SiteManager on the DWR under the Traffic Control remark type and will include information such as date, time, location of impact, length or duration of impact, TCP phase, and any action taken as a result of the occurrence.

B. Division Review

The Division Traffic Engineer shall periodically review traffic control devices and traffic operations on Federal aid construction projects. Reviews should be conducted a reasonable time after initial set-up and following major phase changes. Any deficiencies shall be reported to the PE. Any report prepared may be submitted to the State Traffic Operations Engineer when deemed appropriate by the Division Engineer.

C. Statewide Review

1. **Review Team**

A Review Team consisting of the State Construction Engineer, State Design Engineer, State Traffic Operations Engineer, Division Engineer, or their designees, shall annually review selected projects throughout the State. The State Construction Engineer shall serve as the chairman of the Review Team. An FHWA representative may accompany the Review Team and provide input. A significant project as defined by 23 CFR 630 Subpart J, will be included when available.

2. **Procedure Review**

The Review Team will assess the effectiveness of the Procedure on a state wide basis and recommend revisions to the Procedure when deemed appropriate. All revisions to the Procedure shall be approved by the Transportation Director and the FHWA.

3. **Project Specific Review**

The Review Team will make field observations and review available work zone crash data and operational information for the purpose of recommending improvements or modifications to the work zone.

4. **Reporting**

The Chairman of the Review Team shall provide a written report to the FHWA, the Design Bureau, the Maintenance Bureau, the Divisions, and other departmental offices as appropriate.

D**. Disposition of Records**

After the Department accepts a construction project for maintenance, as defined in Item 105.15(c)1 of the Standard Specifications, all records and reports generated and distributed as part of the Department's review and evaluation of traffic crashes shall be forwarded to the Bureau of Transportation Planning and Modal Programs for appropriate processing. Copies of these records and reports will not be filed or maintained in other offices or locations by the Department.

VI. COORDINATION WITH THE HAZARD ELIMINATION SAFETY (HES) PROGRAM

All activities of the Department, its employees, contractors, agents and assigns conducted pursuant to this procedure including, but not limited to, record gathering and retention, inspection, evaluation, review, and reporting, shall be deemed and are a part of the HES Program as administered by the Department's Bureau of Transportation Planning and Modal Programs.

Part 630 PRECONSTRUCTION

Subpart J Work Zone Safety and Mobility

Authority: 23 U.S.C. 106,109, 115,315,320, and 402(a); 23 CFR 1.32; and 49 CFR 1.48(b).

Source: 69 FR 54569, Sept. 9, 2004, unless otherwise noted

Sec. 630.1002 Purpose.

Work zones directly impact the safety and mobility of road users and highway workers. These safety and mobility impacts are exacerbated by an aging highway infrastructure and growing congestion in many locations. Addressing these safety and mobility issues requires considerations that start early in project development and continue through project completion. Part 6 of the Manual On Uniform Traffic Control Devices (MUTCD)[1] sets forth basic principles and prescribes standards for the design, application, installation, and maintenance of traffic control devices for highway and street construction, maintenance operation, and utility work. In addition to the provisions in the MUTCD, there are other actions that could be taken to further help mitigate the safety and mobility impacts of work zones. This subpart establishes requirements and provides guidance for systematically addressing the safety and mobility impacts of work zones, and developing strategies to help manage these impacts on all Federal-aid highway projects.

[1] The MUTCD is approved by the FHWA and recognized as the national standard for traffic control on all public roads. It is incorporated by reference into the Code of Federal Regulations at 23 CFR part 655. It is available on the FHWA's Web site at http://mutcd.fhwa.dot.gov and is available for inspection and copying at the FHWA Washington, DC Headquarters and all FHWA Division Offices as prescribed at 49 CFR part 7.

Sec. 630.1004 Definitions and explanation of terms.

As used in this subpart:

Highway workers include, but are not limited to, personnel of the contractor, subcontractor, DOT, utilities, and law enforcement, performing work within the right-of-way of a transportation facility.

Mobility is the ability to move from place to place and is significantly dependent on the availability of transportation facilities and on system operating conditions. With specific reference to work zones, mobility pertains to moving road users efficiently through or around a work zone area with a minimum delay compared to baseline travel when no work zone is present, while not compromising the safety of highway workers or road users. The commonly used performance measures for the assessment of mobility include delay, speed, travel time and queue lengths.

Safety is a representation of the level of exposure to potential hazards for users of transportation facilities and highway workers. With specific reference to work zones, safety refers to minimizing potential hazards to road users in the vicinity of a work zone and highway workers at the work zone interface with traffic. The commonly used measures for highway safety are the number of crashes or the consequences of crashes (fatalities and injuries) at a given location or along a section of highway during a period of time. Highway worker safety in work zones refers to the safety of workers at the work zone interface with traffic and the impacts of the work zone design on worker safety. The number of worker fatalities and injuries at a given location or along a section of highway, during a period of time are commonly used measures for highway worker safety.

Work zone[2] is an area of a highway with construction, maintenance, or utility work activities. A work zone is typically marked by signs, channelizing devices, barriers, pavement markings, and/or work vehicles. It extends from the first warning sign or high-intensity rotating, flashing, oscillating, or strobe lights on a vehicle to the END ROAD WORK sign or the last temporary traffic control (TTC) device.

[2] MUTCD, Part 6, ``Temporary Traffic Control," Section 6C.02, "Temporary Traffic Control Zones.'"

Work zone crash[3] means a traffic crash in which the first harmful event occurs within the boundaries of a work zone or on an approach to or exit from a work zone, resulting from an activity, behavior, or control related to the movement of the traffic units through the work zone. This includes crashes occurring on approach to, exiting from or adjacent to work zones that are related to the work zone.

[3] "Model Minimum Uniform Crash Criteria Guideline" (MMUCC), 2d Ed. (Electronic), 2003, produced by National Center for Statistics and Analysis, National Highway Traffic Safety Administration (NHTSA). Telephone 1-(800)-934-8517. Available at the URL: http://www-nrd.nhtsa.dot.gov. The NHTSA, the FHWA, the Federal Motor Carrier Safety Administration (FMCSA), and the Governors Highway Safety Association (GHSA) sponsored the development of the MMUCC Guideline which recommends voluntary implementation of the 111 MMUCC data elements and serves as a reporting threshold that includes all persons (injured and uninjured) in crashes statewide involving death, personal injury, or property damage of $1,000 or more. The Guideline is a tool to strengthen existing State crash data systems.

Work zone impacts refer to work zone-induced deviations from the normal range of transportation system safety and mobility. The extent of the work zone impacts may vary based on factors such as, road classification, area type (urban, suburban, and rural), traffic and travel characteristics, type of work being performed, time of day/night, and complexity of the project. These impacts may extend beyond the physical location of the work zone itself, and may occur on the roadway on which the work is being performed, as well as other highway corridors, other modes of transportation, and/or the regional transportation network.

Sec. 630.1006 Work zone safety and mobility policy.

Each State shall implement a policy for the systematic consideration and management of work zone impacts on all Federal-aid highway projects. This policy shall address work zone impacts throughout the various stages of the project development and implementation process. This policy may take the form of processes, procedures, and/or guidance, and may vary based on the characteristics and expected work zone impacts of individual projects or classes of projects. The States should institute this policy using a multi-disciplinary team and in partnership with the FHWA. The States are encouraged to implement this policy for non-Federal-aid projects as well.

Sec. 630.1008 State-level processes and procedures.

(a) This section consists of State-level processes and procedures for States to implement and sustain their respective work zone safety and mobility policies. State-level processes and procedures, data and information resources, training, and periodic evaluation enable a systematic approach for addressing and managing the safety and mobility impacts of work zones.

(b) Work zone assessment and management procedures. States should develop and implement systematic procedures to assess work zone impacts in project development, and to manage safety and mobility during project implementation. The scope of these procedures shall be based on the project characteristics.

(c) Work zone data. States shall use field observations, available work zone crash data, and operational information to manage work zone impacts for specific projects during implementation.

States shall continually pursue improvement of work zone safety and mobility by analyzing work zone crash and operational data from multiple projects to improve State processes and procedures. States should maintain elements of the data and information resources that are necessary to support these activities.

(d) Training. States shall require that personnel involved in the development, design, implementation, operation, inspection, and enforcement of work zone related transportation management and traffic control be trained, appropriate to the job decisions each individual is required to make. States shall require periodic training updates that reflect changing industry practices and State processes and procedures.

(e) Process review. In order to assess the effectiveness of work zone safety and mobility procedures, the States shall perform a process review at least every two years. This review may include the evaluation of work zone data at the State level, and/or review of randomly selected projects throughout their jurisdictions. Appropriate personnel who represent the project development stages and the different offices within the State, and the FHWA should participate in this review. Other non-State stakeholders may also be included in this review, as appropriate. The results of the review are intended to lead to improvements in work zone processes and procedures, data and information resources, and training programs so as to enhance efforts to address safety and mobility on current and future projects.

Sec. 630.1010 Significant projects.

(a) A significant project is one that, alone or in combination with other concurrent projects nearby is anticipated to cause sustained work zone impacts (as defined in Sec. 630.1004) that are greater than what is considered tolerable based on State policy and/or engineering judgment.

(b) The applicability of the provisions in Sec. Sec. 630.1012(b)(2) and 630.1012(b)(3) is dependent upon whether a project is determined to be significant. The State shall identify upcoming projects that are expected to be significant. This identification of significant projects should be done as early as possible in the project delivery and development process, and in cooperation with the FHWA. The State's work zone policy provisions, the project's characteristics, and the magnitude and extent of the anticipated work zone impacts should be considered when determining if a project is significant or not.

(c) All Interstate system projects within the boundaries of a designated Transportation Management Area (TMA) that occupy a location for more than three days with either intermittent or continuous lane closures shall be considered as significant projects.

(d) For an Interstate system project or categories of Interstate system projects that are classified as significant through the application of the provisions in Sec. 630.1010(c), but in the judgment of the State they do not cause sustained work zone impacts, the State may request from the FHWA, an exception to Sec. Sec. 630.1012(b)(2) and 630.1012(b)(3). Exceptions to these provisions may be granted by the FHWA based on the State's ability to show that the specific Interstate system project or categories of Interstate system projects do not have sustained work zone impacts.

Sec. 630.1012 Project-level procedures.

(a) This section provides guidance and establishes procedures for States to manage the work zone impacts of individual projects.

(b) Transportation Management Plan (TMP). A TMP consists of strategies to manage the work zone impacts of a project. Its scope, content, and degree of detail may vary based upon the State's work zone policy, and the State's understanding of the expected work zone impacts of the project. For significant projects (as defined in Sec. 630.1010), the State shall develop a TMP that consists of a

Temporary Traffic Control (TTC) plan and addresses both Transportation Operations (TO) and Public Information (PI) components. For individual projects or classes of projects that the State determines to have less than significant work zone impacts, the TMP may consist only of a TTC plan. States are encouraged to consider TO and PI issues for all projects.

(1) A TTC plan describes TTC measures to be used for facilitating road users through a work zone or an incident area. The TTC plan plays a vital role in providing continuity of reasonably safe and efficient road user flow and highway worker safety when a work zone, incident, or other event temporarily disrupts normal road user flow. The TTC plan shall be consistent with the provisions under Part 6 of the MUTCD and with the work zone hardware recommendations in Chapter 9 of the American Association of State Highway and Transportation Officials (AASHTO) Roadside Design Guide. Chapter 9 of the AASHTO Roadside Design Guide: "Traffic Barriers, Traffic Control Devices, and Other Safety Features for Work Zones" 2002, is incorporated by reference in accordance with 5 U.S.C. 552(a) and 1 CFR part 51 and is on file at the National Archives and Record Administration (NARA). For information on the availability of this material at NARA call (202) 741-6030, or go to http://www.archives.gov/federal--register/code--of--federal--regulations/ibr--locations.html. The entire document is available for purchase from the American Association of State Highway and Transportation Officials (AASHTO), 444 North Capitol Street, NW., Suite 249, Washington, DC 20001 or at the URL: http://www.aashto.org/bookstore. It is available for inspection from the FHWA Washington Headquarters and all Division Offices as listed in 49 CFR Part 7. In developing and implementing the TTC plan, pre-existing roadside safety hardware shall be maintained at an equivalent or better level than existed prior to project implementation. The scope of the TTC plan is determined by the project characteristics, and the traffic safety and control requirements identified by the State for that project. The TTC plan shall either be a reference to specific TTC elements in the MUTCD, approved standard TTC plans, State transportation department TTC manual, or be designed specifically for the project.

(2) The TO component of the TMP shall include the identification of strategies that will be used to mitigate impacts of the work zone on the operation and management of the transportation system within the work zone impact area. Typical TO strategies may include, but are not limited to, demand management, corridor/network management, safety management and enforcement, and work zone traffic management. The scope of the TO component should be determined by the project characteristics, and the transportation operations and safety strategies identified by the State.

(3) The PI component of the TMP shall include communications strategies that seek to inform affected road users, the general public, area residences and businesses, and appropriate public entities about the project, the expected work zone impacts, and the changing conditions on the project. This may include traveler information strategies. The scope of the PI component should be determined by the project characteristics and the public information and outreach strategies identified by the State. Public information should be provided through methods best suited for the project, and may include, but not be limited to, information on the project characteristics, expected impacts, closure details, and commuter alternatives.

(4) States should develop and implement the TMP in sustained consultation with stakeholders (e.g., other transportation agencies, railroad agencies/operators, transit providers, freight movers, utility suppliers, police, fire, emergency medical services, schools, business communities, and regional transportation management centers).

(c) The Plans, Specifications, and Estimates (PS&Es) shall include either a TMP or provisions for contractors to develop a TMP at the most appropriate project phase as applicable to the State's chosen contracting methodology for the project. A contractor developed TMP shall be subject to the approval of the State, and shall not be implemented before it is approved by the State.

(d) The PS&Es shall include appropriate pay item provisions for implementing the TMP, either through method or performance based specifications.

(1) For method-based specifications individual pay items, lump sum payment, or a combination thereof may be used.

(2) For performance based specifications, applicable performance criteria and standards may be used (e.g., safety performance criteria such as number of crashes within the work zone; mobility performance criteria such as travel time through the work zone, delay, queue length, traffic volume; incident response and clearance criteria; work duration criteria).

(e) Responsible persons. The State and the contractor shall each designate a trained person, as specified in Sec. 630.1008(d), at the project level who has the primary responsibility and sufficient authority for implementing the TMP and other safety and mobility aspects of the project.

Sec. 630.1014 Implementation.

Each State shall work in partnership with the FHWA in the implementation of its policies and procedures to improve work zone safety and mobility. At a minimum, this shall involve an FHWA review of conformance of the State's policies and procedures with this regulation and reassessment of the State's implementation of its procedures at appropriate intervals. Each State is encouraged to address implementation of this regulation in its stewardship agreement with the FHWA.

Sec. 630.1016 Compliance date.

States shall comply with all the provisions of this rule no later than October 12, 2007. For projects that are in the later stages of development at or about the compliance date, and if it is determined that the delivery of those projects would be significantly impacted as a result of this rule's provisions, States may request variances for those projects from the FHWA, on a project-by-project basis.

1:3 CONSTRUCTION REPORTS AND RECORDS

1:3:A CONSTRUCTION REPORTS AND RECORDS (UNIFORM FILING SYSTEM)

An important item necessary to properly administer a Project Office is a filing system that is consistent with good business procedures. This system must be such that Project Personnel, as well as other visiting Engineers can find any record quickly and easily. So we can develop this needed consistency an established uniform filing system is recommended for use on all projects.

Work activities will vary from project to project and consequently, the order of recommended file folders will also vary. It may be necessary to add additional folders or delete folders, which are or are not applicable to the work activities included within the project. The following order of labeling and numbering should be adhered to as close as possible when establishing a filing system for a project. Additional folders needed to cover items of work in the project and necessary to complete the filing system should be numbered in similar fashion as implied and illustrated throughout this section. Conversely, files not needed due to the absence of an item from the project should have their assigned number omitted. A table of contents, which can be used as a quick reference to the project filing system should indicate this.

Since this is the only part of the Construction Manual which covers the project filing system the 1:3: prefix portion of the numbering system for the folders may be omitted to ease the labeling and numbering process.

The Project filing system should consist of four basic sections:

A. Contract Documents

This section of the project files should contain folders on the contract and contract modifications.

1. File Folder marked "Contract".

This folder should contain the following information:

Contract
Award of contract letter
"Notice to Proceed" letter
FHWA letter of authorization and Federal Aid Agreement (if Federal Aid Project)
Final acceptance letter

2. File Folder marked "Supplemental Agreements and Change Requests".

This folder should contain all Supplemental Agreements and Change Requests with back-up data as submitted on the right side, and approved Supplemental Agreements and Change Requests on the left side.

3. File Folder marked "Subcontractors".

All requested and approved Subcontractor agreements and rental agreements should be maintained in this file. Separate folders for each Subcontractor, labeled with their names and numbered as follows **A:3.a, A:3.b, etc.** should be kept on the project.

4. File Folder marked "Monthly Estimates".

This folder should contain all monthly estimates placed on the right and information on partial payments, placed on the left. Supplemental folders should be created to contain information, which directly supports monthly estimates. These supplemental folders should be labeled and numbered as follows**: A:4.a "Asphalt Index", A:4.b "Estimate Data", A:4.c "Concrete Quantity" A:4.d "Mobilization Work Sheet**" **etc.** Actual sources for locating and identifying data that supports the quantities paid may be found in binder assembly **(Monthly Estimate Register)** of **C-30 forms** for the project.

5. File Folder marked "Progress Reports".

This folder should contain the letter from the project Engineer to the Division Office advising when the Contractor began work, and all Progress Reports. Any letters from the Contractor objecting to time charges, requests for time extensions, requests for time suspensions, etc., should be in this file. All letters, along with the Contractor's Schedule of Operations, should be attached on the left side of the folder and all progress reports on the right side.

6. File Folder marked "Pre-construction Conference & Misc. Project Control Plans".

This folder should contain minutes of the pre-construction conference placed on the right side. The left side of the folder should contain submitted and approved copies of the Contractor's erosion control plan, disposal of debris plan, fire prevention plan and plan for the control of concrete temperature during hot weather operations.

7. File Folder marked "Correspondence - Right of Way & Pit Agreements".

A copy of all Project R.O.W. agreements should be filed on the right side of this folder. Also, any applicable pit agreements should be included in this folder on the left side.

8. File Folder marked "Correspondence – Utilities".

All correspondence related to utility adjustments, including utility agreements should be placed in this file. On some projects it may be necessary to maintain a folder for each utility company involved. When this is necessary they should be labeled with each utilities name and numbered as follows: **A:8.a, A:8.b, A:8.c, etc.**

9. File Folder marked "Construction Information Memorandums".

This folder should contain copies of all "Construction Information Memorandums" (C.I.M.s) issued by the Construction Bureau, not just the ones written during the life of the Project. This file folder should be maintained perpetually by the Project Engineer and carried forward from project to project. When forwarding final plan assemblies to the Division Office only copies of those C.I.M.s which have an effect on project pay items or plan quantities need be included.

10. File Folder marked "Correspondence – General".

All correspondence, which has not previously been designated for other folders, should be placed in this folder, incoming on the right and outgoing on the left. For larger projects, the Project Engineer may wish to have additional general correspondence folders for correspondence with further separations of Contractor and Department correspondence. Additional folders should be labeled **A:10.a, A:10.b, etc.** and continued as needed. It is suggested that the date of receipt should be placed on all correspondence received in the project office.

11. File Folder marked "NPDES General Permit, Reports & Inspections"

This folder should contain copies of all NPDES permits, reports, inspections, and correspondence. The permit and inspection reports should be placed on the left side of the folder and all other correspondence placed on the right side of the folder.

12. File Folder marked "Contractor Claims"

This folder should contain copies of all correspondence pertaining to a claim for additional time or monetary compensation involving the project.

13. File Folder marked "Force Account Work"

This folder should contain copies of all correspondence pertaining to work performed on the project by Force Account procedures.

14. File Folder marked "Railroad" (General)

This folder should contain copies of all correspondence, invoices, etc. pertaining to railroad work involved with the project. Place invoices on the left and correspondence on the right.

B. Test Reports

1. File Folder marked "Test Reports" (General).

This folder should contain copies of the Asphalt Plant Check List, Transit and Central Concrete Plant Check List, scale checks, certificate of certified weigh masters, and any other such general items concerned with testing and test reports. Include test reports for materials not covered by a specific item number such as re-steel, grates, rings/covers etc.

2. File Folder marked "Test Reports" (Design Mixes).

This folder should contain copies of all concrete and asphalt plant mix design job mixes. Place concrete design mixes on the left side of the folder and asphalt plant mix design mixes on the right side of the folder.

3. File Folder marked "Test Reports" (Insert type material).

Individual folders should be used for each type material tested. They should be labeled and numbered as follows: **(specific material & item) B:3:a, (specific material & item) B:3:b, etc. Form BMT-38** should be maintained on the left side of each folder. As test reports are received, they should be filed on the right side of the folder and the laboratory number and quantity tested recorded on the **BMT-38** on the left side. Material guaranties, **BMT-73**, should also be filed on the right side.

The current policy of the Department is that no payment will be made for materials installed and for which the Contractor is responsible for securing the test reports until such test reports are received. The above outlined procedure for continuous maintenance of **Form BMT-38** will provide a correlation at each monthly estimate of "to-date" quantities versus quantities represented by test reports. This procedure will also provide for a completed **Form BMT-38** at the time of project completion.

Materials requiring density testing should have an additional file folder established to contain density reports along with any required forms, reports, or back-up data for both the department and Contractor.

These folders should be labeled and numbered as follows: **(specific material) B:3:a.1, (specific material) B:3:b.1, etc.**

4. File Folder marked "BM&T Technical Memorandums".

This folder should contain copies of all technical memorandums issued by the Bureau of Materials & Tests, not just the ones sent during the life of the project. This file folder should also be maintained perpetually by the Project Engineer and carried forward from project to project. When forwarding final plan assemblies to the Division Office only copies of those technical memorandums which have an effect on the project pay items or plan quantities need be included.

5. File Folder marked "BM&T Technical Advisories".

This folder should contain copies of all M&T advisories issued by the Bureau of Materials & Tests. It to should be maintained perpetually by the Project Engineer and carried forward from project to project.

6. File Folder marked "QC/QA Correspondence"

This folder should contain copies of all correspondence, which pertains to QC/QA requirements for items included in the project.

Due to the vigorous testing requirements of QC/QA additional folders should be created to accommodate the various test reports required for each individual item. These folders should be labeled with the name of the specific type item and plentiful enough to provide a separate folder for each of the BMT or QC/QA forms required for each item. The numbering sequence should be as follows: **B:6.a.1, B:6.a.2, B:6.a.3 etc**. For instance, these three folders would accommodate **(1) BMT-20**, **(2) BMT-21**, and **(3) QC/QA 1,2, 3 & BMT-97** for one item of bituminous plant mix. It would then be necessary to repeat this procedure for the next item with the next set of numbers increasing accordingly (example.) **B:6.b.1, B:6.b.2 etc.**

7. File Folder marked "Material Submittals"

This folder should contain copies of correspondence, equipment, material and its supporting data, which requires approval from the central office. Place non-approved submittal data on right and approved submittal data on the left.

C. Inspector's Reports.

1. File Folder marked "Daily Inspector's Reports" (Insert operation such as grading, pipe, inlets, curb & gutter, etc.)

A folder should be in the files for the various items requiring inspection. Each folder will contain the carbon copy of the inspector's daily report. If more than one inspector inspects the same item, each inspector's report should be filed together.

2. File Folders marked "Daily Placement Reports" (Specify Material)

Daily Placement Reports should be in separate files for the individual items requiring inspection. Folders should be labeled for specific items and the numbering continued as follows: **C:2.a, "Concrete Placement Reports" C:2.b "plant mix" (mix specific) etc.** Placement reports should be on the right side of the folder along with any required forms or backup data. If more than one inspector inspects the same item, each inspector's report should be filed together.

3. File Folder marked "FHWA Inspection Reports"

This folder should contain copies of all project inspection reports received as a result of inspections made by FHWA personnel.

4. File Folders marked "Traffic Control Correspondence & Traffic Accident Reports /Form C-25".

A folder should be established to contain all correspondence pertaining to project traffic control. An additional folder should contain copies of all accident reports, along with a completed and attached copy of Project Traffic Control Inspectors Accident Report, which have occurred within the limits of the project since its inception. These reports should be placed on the left side of the folder and **Forms C-25** "Daily Inspection Report of Traffic Control Devices" should be placed on the right side of the folder.

D. Contractor's Payrolls, EEO and Trainees.

1. File Folders marked "Contractor's Payroll Correspondence, Transcripts, & Affidavits".

Sufficient folders are to be maintained on this subject to include an up-to-date record of the status of each transcript, pending correspondence, requested payroll corrections, affidavits authorizing person to sign payrolls**, Ala. forms 100 and 150**, etc., and copies of the Contractor and Subcontractor's payrolls.

2. File Folders marked "EEO".

These folders should contain all EEO correspondence, labor interviews, DBE/WBE verifications and compliance reviews.

3. File Folders marked "Trainee Reports".

Should contain all initial, monthly, semi-annual and final trainee reports. It is suggested that a separate folder be maintained on each trainee. A monthly summary of hours trained should be maintained on the left side of each folder with an explanation when the trainee completes his/her training, is terminated or quits.

4. File Folder marked "DBE Utilization plan, correspondence and records".

This Folder should contain copies of DBE Utilization plan and each DBE verification Report on the left side of the folder. Any correspondence pertaining to DBE requirements for the project should be kept on the right side of the folder.

1:3:B REVIEW & PROCESS MONTHLY & FINAL ESTIMATES

1:3:B:1.1 PREPARATION OF ESTIMATES AT PROJECT LEVEL.

The information contained in this section is recommended for use by the Project Engineer and his/her staff in preparing and documenting pay quantities shown on each monthly estimate and the final estimate. All pay quantities must be properly documented and referenced. Delivery tickets covering commercial materials (Except reinforcing steel and structural steel) which are measured by weight for pay purposes shall contain the original signature (No initials) of a qualified weighmaster. Delivery tickets shall not be paid without this signature nor the validation receipt signature of the project field inspector. The methods contained herein will accomplish this end.

1:3:B:1.2 RESPONSIBILITY.

The keeping of complete and accurate project records in support of all pay quantities is one of the major responsibilities of the Project Engineer and his/her staff. All construction records for the project shall be prepared under the direct and active supervision of the Project Engineer. The preparation of data for estimates should begin the day the Project Engineer is assigned to the project and continue until the completion of the project.

The Project Engineer should make a thorough study of the plans and the various pay items included in the contract. Considerable forethought should be given to the methods of measurement for the various items and steps taken to keep adequate supporting data for documenting all pay quantities shown on each monthly estimate as well as the final estimate. The method presented in this manual for the documentation of pay quantities is an acceptable method of maintaining proper documentation.

1:3:B:1.3 ESTIMATE DATA.

Estimate data shall include all field data books, project files, Inspector's Daily Reports, Project Diaries, Material Test Reports, haul tickets, bar lists, shipping invoices, Change orders, Supplemental Agreements and any special official instructions or documents required to support the measurements and computations for all pay quantities used on the project.

The estimate data should be complete enough to allow any subsequent audit and complete check of the estimate quantities by competent personnel. Project records must be adequate to support all official statements and figures contained in the project files. These records should clearly indicate the place, date, time, person, method, and original basic source document from which the information was obtained.

The Project Engineer must not lose sight of the fact that he/she must keep his/her estimate data in complete clear detail so that he/she can produce at any time the basic recorded or tabulated measurements, weights, cross-sections, haul tickets, shipping invoices or other documents from which his/her pay quantities were developed.

The project records must be complete so that the merit or lack of merit of a claim can be properly evaluated.

Most ALDOT projects involve Federal Funds. Project records and estimate data must be complete so as to permit ready verification of quantities by Federal Highway Administration Engineers and Auditors. Good, clear records will expedite FHWA approval of work and payment of Federal Funds.

1:3:B:1.4 TEST REPORTS.

The preparation of **Form BMT-38**, Summary of Tests, should begin with the start of the project and all Test Reports should be posted as received **(See Plate H contained herein).** A running total shall be kept on all pre-tested and tested materials approved by the Department **(See Form C-30 - Plate "Z")**.

The "To Date Quantity" for materials in place should be checked against this record each month prior to including them on the monthly estimate. No payment will be made for any item for which the Contractor is responsible for furnishing the test report (excepting Structural Steel and cylinder breaks for concrete) until the test report has been received.

The Engineer may permit use, prior to sampling and testing, of certain materials accompanied by a signed materials guaranty on the form furnished by the Department which guarantees the materials conform to Departmental Specifications. See Subarticle 106.02(a).

1:3:B:1.5 PROJECT DIARY AND INSPECTOR'S DAILY REPORTS.

Refer to Part 1, Section 2, Article M of this manual.

1:3:B:1.5 PROJECT DIARIES.

Of all records kept by the Project Engineer and his/her staff, none is more important than the daily record of activities on a project. While the Project Diary is not to be used primarily as a construction detail book, it should carry sufficient construction data to verify the construction records kept in the Inspector's Daily Reports and other record books. A detailed description of each construction operation is not necessary since this information is shown in the Inspector's Daily Report.

A properly kept Project Diary is invaluable to the Project Engineer and to the Department. Primarily, the Project Diary should be a record of administrative details, working conditions, and personnel on the work performed. The Project's entire field and field office staff and all of the Contractor's personnel should be listed each day. A well kept Project Diary should also contain information as to special instructions given the Contractor as well as an accurate record of happenings on the project which cannot be considered normal.

The Project Engineer should keep a complete record of special instructions to the Contractor, with names of witnesses and Contractor's representatives involved, especially those dealing with phases of work over which some controversy has developed or may develop. Sound judgement and foresight should be employed because that which may seem to be an insignificant instruction or incident today may develop into a major controversy or lawsuit against the Contractor or the Department at some later date. An accurate documentation of events can contribute heavily towards the resolving of an issue.

The Project Diary sometimes becomes a court exhibit in litigation by Contractors or property owners regarding claims. Each entry should be made with the thought in mind that it may someday be a legal instrument that will substantiate a just claim or disprove an unjust one. Do not erase recorded data. Draw a single line through an incorrect entry so that it is still legible, and place the correct value above it. Void an entire page by drawing diagonal lines to the corners of the page. The person making the corrections should initial each change.

The Project Diary must be complete with an entry made each day throughout the life of the contract. Particular attention must be given to the controlling item or items of work in effect, and to the working conditions on these items. The Contractor's personnel and equipment, the hours worked, etc., must be placed in their proper spaces in the diary. Any day on which there might be a question concerning time charges, there must be a full discussion as to the reason for charging or for not charging a working day. The adequacy of the Contractor's work force and equipment is of vital concern. The Project Engineer should indicate each day whether in his/her opinion progress is satisfactory or unsatisfactory. Record all conferences of consequence with the Contractor or his/her representatives regarding safety requirements, labor conditions and EEO activities. Record all precipitation and time it fell on project.

To assist the Project Engineer in recording the proper information in the Project Diary, each inspector is required to prepare an **Inspector's Daily Report (Form BC-lO1)** describing in full the daily activities on the work, which he/she inspects. (See the example of a properly prepared Inspector's report in this manual). This report is to be used as a backup document for specific details to support the Project Diary. The original copy of the Inspector's Daily Report is to be filed and made a part of the permanent documentation for the project, with the carbon copy of this report being retained by the inspector.

The Project Engineer shall check these reports daily, writing in any comments which may add to the completeness of the record and initial each daily entry.

The grading Inspector's Daily Report should show the number and type of equipment, approximate crew at each grading site (described by Station numbers), points from and to which excavation or borrow is being moved, approximate amounts, and any comment on lack or excess of watering and on compaction results. Comments should be made on items inspected as to satisfactory or unsatisfactory conditions and any other information of importance not discussed with the Project Engineer.

All Inspectors' Daily Reports should follow the same format. The Project Engineer shall see that all items of work are included on an Inspector's Daily Report.

A Daily Utility Relocation Report **(Form SP-l)** shall be kept covering work by utility companies. (See example contained herein). This report should show all Utility personnel on the project and hours worked, type equipment, materials used, and any recovered materials. Any deviation from plans shall be noted on the report and indicated on the plans "as built." Comment should be made regarding any lag in utility work as compared to the original agreement, any interference of utilities or utility relocation work with the Contractor's operations, and any conferences or decisions of consequence regarding utility work. All information necessary to check the Utility's final bill or claim should be shown on the reports and submitted for review and approval by the Division Utility Engineer.

Any reports, letters, memoranda, computations, notes, etc., affecting important entries in the Project Diary should be retained for possible future reference. Upon completion of the project, all Project Diaries and Inspector's Daily Reports must be delivered to the Division Office for safekeeping, along with other project documents.

1:3:B:1.6 MONTHLY ESTIMATES

In order to provide the Contractor with operating capital, the Standard Specifications provides that once in each month the Project Engineer will make an estimate of the work or portion of the work completed and the value thereof based on the Contract Unit Prices or proportional part thereof for Lump Sum items.

Preprinted estimate forms will be used on all projects. Before using, these forms should be checked against the contract to assure correctness of the Contractor's address, project number, item descriptions, unit and unit prices.

When preparing this form, extreme care should be taken that sufficient documentation is on hand whereby all quantities may be verified. It is the responsibility of the Project Engineer to keep an accurate station to station record substantiating the quantity or amount of each item included for payment on the monthly estimate.

Records may be kept in a Monthly Estimate Book or on loose-leaf sheet attached to the Project Engineer's copy of monthly estimates. Each pay quantity must be documented on **form C-30** and referenced to the backup information, which will support the pay quantity.

It is not intended that the Project Engineer make actual field measurements on every item in order to verify the quantities allowed on the estimate, but that he/she be able to verify his/her estimated quantities as taken from the plans Summary of Quantities Sheets or on the job inspection. However, there are many items, which of necessity must be accurately field measured and documented as they are completed
since they may be obliterated or covered during the progress of construction. When this is the case, the Project Engineer should make accurate measurements prior to removal in cases where the item is to be removed or as soon as the work is completed in cases of new work.

The Project Engineer or other person responsible for preparing the "Work" copy of the monthly estimate should first enter the estimate number in the heading of the preprinted forms along with the code number. The period covered by the estimate will begin on the date work began on any pay item and end each month on the estimate date established by the Division Office.

All quantities performed during the current month should be shown in the "This Month" column, proper money extensions should be made under the same column. The above quantities and money extensions shall be carried over to the "To Date" column to include any amounts shown on previous estimates.

The preparation of estimates for projects, which are not furnished preprinted forms, is the same, except the Contractor's address, item descriptions, and units prices must be written in.

Occasionally, it is necessary for partial payments to be made on certain items stored at or near the project site. Since the amount of payment for stored or stockpiled items will be different than the contract unit price, the recommended procedure for incorporating these items into the pre-printed estimate form is as follows:

Add the item, indicating that it is a partial payment covered by a specific Article in the Standard Specifications, "between-the-lines" either above or below the contract bid item. If space does not allow for adding-in, the partial payment may be placed on an additional sheet numbered X-A. This additional sheet should precede the pre-printed estimate sheet that shows the subtotal for the particular section (Roadway, Construction Engineering, or Bridge) concerned.

For partial payments that are made based on the Contractor's cost of the items, the Contractor as required by the Standard Specifications should furnish a certified invoice with the items listed in detail. Payment for "Per Each" items will be made based on the percent complete. An example of this would be if 20 inlets are 50% complete, then make payment for 10 inlets. Careful documentation of this type of payment must be kept to avoid any under/over payment.

Work performed by Force Account may be shown on the estimate as a lump sum item. A detailed listing of the Contractor's labor, equipment and material used should accompany the estimate. When partial payment is to be made on Force Account work, the payment must have sufficient documentation to substantiate the amount paid on the estimate. See Subarticle 109.04(b).

No estimate will be required when the work performed since the last estimate amounts to less than $2,500.00. See Article 109.07.

1:3:B:1.7 <u>Final Estimate Documentation</u>

Following the check and verification of final quantities the following supporting data shall be provided as a part of final estimate documentation.

(1) A non-resident Contractor must provide a certified "statement of good standing" from the State Department of Revenue and the appropriate County and/or City authority. This statement shall certify that the non-resident Contractor has paid all taxes due and payable to the State of Alabama or any political subdivision thereof. This document is required for each county and city in which work is performed.

(2) Proof of publication of advertisement of project completion as per Item 105.15(c)4.

(3) No payment will be made until the Contractor submits a signed affidavit attesting that all known debts for labor and materials used on the project and all approved sub-contractual obligations associated with the construction of the project have been paid or will be paid within five days after final payment.

(4) A certification of actual payments to DBE firms. This certification requires sign off by the Prime Contractor and the individual DBE firms involved on the project.

(5) In addition to pre-printed estimate forms a completely executed and notarized original of the signature page of **Form 3** is required to be a part of the final estimate.

1:3:B:1.8 FINAL PLAN ASSEMBLIES.

The Final Plan Assembly shall consist of the following sheets:

Title Sheet.

Full size plan Title Sheet shall be used. Correct index of sheets to agree with sheets in Final Plan Assembly. Correct all project data that is shown on the Title Sheet with black ink so that it will conform to the actual construction.

Typical Section Sheets.

Full size plan sheets should be used with all revisions made on construction shown in black ink.

Summary of Quantities Sheets.

The Summary of Quantities Sheet shall list all contract pay items with both the plan quantity and the final quantity for each item. Use full size Summary of Quantities Sheet or, if required information cannot be clearly shown, remake this sheet in dark pencil on cross-section paper. Be sure to indicate items either added or deleted by Supplemental Agreement. If no work was performed on an item, show the figure zero in the final quantity column. Following the description of each Pay Item, give a reference for the supporting data for the final quantity. **(Refer to example plate A contained herein.)**

Summary of Quantities Box Sheets.

In order to show a tabulation of the various pay items involved in the construction of minor structures, pipe, flumes, fencing, relocation of structures, guardrail, etc., "boxes" similar to those in the plans should be prepared. These sheets should be in dark pencil on cross-section paper. Preparation of these sheets tends to prevent the omission of an entire structure with all pay quantities involved. Experience has shown that such omissions are easily made when the quantities to be totaled are scattered in several different books.

Plan-Profile Sheets.

Full size plan-profile sheets shall be used. Line out with black ink all original data that is incorrect and insert correct construction data. Be sure to show all pipe lines, culverts, flumes, etc., that were added on construction.

Pit Layout Sheet.

Full size plan sheets should be used, if pit indicated in plans. Changes in pit owners and locations should be corrected in black ink. On Contractor material sources, maintain cross-section sheets with original/final sections and calculated quantities.

Special Drawings.

On construction, many times, it is necessary to adapt a Standard Drawing to fit the local conditions. When this is done sheets showing detailed drawings completely dimensioned and all calculations necessary to determine the quantities should be prepared. Each drawing should be identified by Station location.

Paving Layout Sheets.

The plans for projects in urban areas usually have Paving Layout Sheets on a large scale showing curb and gutter, sidewalks, drainage, paving details, etc. These sheets should be corrected in black ink to conform to changes on construction.

Standard Drawings

Full size plan copies of Standard Drawings that are not included in the Standard Drawing Book used on construction should be included in the Final Plan Assembly to aid in checking the Final

Drainage Sheets

Special drainage sheets for all minor structures and pipes should be included in the Final Plan Assembly. Show all quantities for each structure on the drainage sheet.

Cross-Section Sheets

The final cross-sections can be plotted by either project personnel or the design section of the Division Office utilizing data collectors and computerized equipment. The original cross-sections should be inked. Do not use blueprinted plan cross-section sheets. All computations of quantities should be shown on the cross-section sheets. If quantities are calculated by computer, quantity reports should be generated and included with cross section sheets. Be sure to indicate the scale being used.

Shop and Working Drawings

Include an approved copy of all Working Drawings and Shop Drawings used on the Project.

1:3:B:1.9 GUIDELINES AND SUGGESTIONS FOR VERIFYING QUANTITIES.

In order to have consistency and to facilitate and expedite the verification of final quantities, a list of pay items are provided in **Unit I:3:B:I.I0** with suggestions concerning the collection, preparation, submission and checking of the necessary data on each pay item. Also noted is the number of decimals to be used for computing and reporting quantities.

Paragraph (1) under each respective pay item is recommended for use at the Project level in preparing data for monthly estimates.

Paragraph (2) under each respective pay item is recommended for use at the Project Level in preparing final quantity data for submission to the Division Office.

Paragraph (3) under each respective pay item is recommended for use at Division Level in checking all data submitted.

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION

1:3:B:1.10 LIST OF PAY ITEMS

201-A	**L.S.**	**0**	**CLEARING & GRUBBING**

(1) This item has a lump sum contract price for the entire right of way and easement area. At each estimate period, the Project Engineer shall pay a percentage of the contract price based on the estimated percent complete subject to the limitations of Subarticle 201.04(b) of the standard specifications. The areas for each estimate should be shown on a set of plan-profile sheets and should be blocked out or otherwise noted so that each estimate area can be determined. When changes in location, R.O.W. widths, or easement areas result in changes in areas from those shown on the plans, see Subarticle 201.05(a) of the Standard Specifications for measurement and payment.

(2) The above set of plan-profile sheets shall become a part of the final estimate data. Submit R.O.W. maps, documents and sketches showing changes in right of way and easement areas from the original construction plans including all dimensions and calculations to determine increase or decrease from the contract quantity.

(3) Check supporting data and calculations on any special or plan drawings showing increase or decrease from the contract lump sum payment.

201-B	**ACRE**	**2**	**SELECTIVE CLEARING**

(1) The areas for each estimate should be shown on a set of plan-profile sheets as well as shown in a field book. Areas for each estimate period should be blocked out or otherwise noted so that each estimate area can be determined. In the field book include locations by stations, measurements, sketches, calculations and estimate number on which payment is made. Determine the quantity completed at the end of each estimate period. **(Refer to methods of determined the area of irregular sections included on Plate B.) See 1:3:B:1.11 page 3 of 26.**

(2) The above set of plan-profile sheets shall become a part of the final estimate data. Submit field book and list final quantities on Summary of Quantities Sheets.

(3) Check sketches, measurements, and computations against field measurements. Check and compare final quantity with total shown on Summary of Quantities Sheet.

205-A	**L.S.**	**0**	**REMOVAL OF STRUCTURES**

(1) Although this item has a lump sum contract price, the Project Engineer shall pay a percentage of the contract price based on the number of structure units 100% complete at the end of each estimate period. The Project Engineer shall keep a field book containing data on all structures shown to be removed on the plans. This data should include type of structure, location, unit cost of removal, date of removal and monthly estimate number on which payment is made.

(2) Submit Removal of Structures Book and list in box on Summary of Quantities Sheet showing structure number, location by stations, and type structure.

(3) Check Summary of Quantities Box Sheet against number contained in the Contract. If any structure units have been deleted, check to see if the lump sum payment has been reduced by the amount bid for the unit or units involved.

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION
205-B	**L.S.**	**0**	**RELOCATION OF STRUCTURES**

(1) Although this item has a lump sum contract price, the Project Engineer shall pay a percentage of the contract price based on the number of structure units 100% complete at the end of each estimate period. The Project Engineer shall keep a field book containing data on all structures shown to be relocated on the plans. This data should include the type of structure, estimated cost of relocation, location, date of removal, date of completion and estimate number on which payment is made. Upon completion of each structure, the Project Engineer and/or Inspector should visually inspect it. The Contractor must furnish signed Structure Releases.

(2) Submit signed Structure Releases, Relocation of Structures Book, and list in box on Summary of Quantities Sheet showing structure number, type structure, and location by stations

(3) Check signed Structure Releases and Summary of Quantities Box Sheet against the number contained in the Contract. If any structure units have been deleted, check to see if the lump sum payment has been reduced by the amount bid for the unit or units involved.

206-A	**L.S.**	**0**	**REMOVAL OF OLD BRIDGE, STATION_____**
206-B	**L.S.**	**0**	**REMOVAL OF OLD BOX CULVERT, STATION_____**

(1) Although there is a lump sum contract price for each bridge or culvert removed or partially removed, the Project Engineer shall estimate the percent removal complete at the end of each estimate period for partial payment. List each structure in a Removal of Structures Book showing location, description, estimated cost of removal, date removal began, date removal was completed, estimate numbers and amounts paid on each.

(2) Submit Removal of Structures Book and list on the Summary of Quantities Box Sheet.

(3) Check the Summary of Quantities Box Sheet against the original construction plans and contract.

206-C	**S.Y.**	**1**	**REMOVING _*_**

**** Concrete Sidewalk, Concrete Pavement, Concrete Crosswalks, Concrete Bases, etc.***

(1) Show in a field book. Include location by stations, measurements, sketches, calculations and estimate number on which payment is made. Determine the quantity completed at the end of each estimate period**. (Refer to methods of determining the area of irregular sections included on Plate B.) See 1:3:B:1.11 page 3 of 26.**

(2) Submit the field book and any special drawings showing the quantities removed. Show final quantities on the Summary of Quantities Sheet.

(3) Check drawings and computations against field measurements. Check and compare final quantity with total shown on Summary of Quantities Sheet.

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION
206-D	**L.F.**	**1**	**REMOVING _*_*_**

***** PIPE, GUARDRAIL, CURB, CURB & GUTTER, RAILROAD TRACKS, ETC.***

(1) List in a field book. Show location by stations, description, length removed, date removed, necessary computations and estimate number on which each quantity is paid. Refer to Article 206.05 for method of measurement.

(2) Submit field book containing measurements and computations. Show final quantities on the Summary of Quantities Sheet.

(3) Check computations in field book and compare final quantity with total shown on the Summary of Quantities Sheet.

206-E	**EACH**	**0**	**REMOVING _*_*_*_**

****** HEADWALLS, INLETS, ETC.***

(1) List each structure in a field book. Indicate location by station, description, date removed, and estimate number on which payment is made.

(2) Submit field book containing these structures. Show totals on Summary of Quantities Sheets.

(3) Check quantities shown on Summary of Quantities Sheet against totals in field book.

208-A	**EACH**	**0**	**REMOVAL AND REINTERMENT OF GRAVE**
208-B	**EACH**	**0**	**REMOVAL AND REINTERMENT OF GRAVE AT DESIGNATED SITE**

(1) List each grave in a field book. Indicate location by station, description, date removed and re-interred, and estimate number on which payment is made.

(2) Submit field book containing these graves. Show totals on Summary of Quantities Sheet.

(3) Check quantities shown on Summary of Quantities Sheet against totals in field book.

209-A	**EACH**	**0**	**MAILBOX RESET, _*_**

**** Specify "Single", "Double or Multiple"***

Note! 1, 2, and 3 same as Item No. 206-E

210-A	**CYIP**	**0**	**UNCLASSIFIED EXCAVATION**

(1) The Average End Area (or other acceptable) method shall be used to compute quantities from cross-sections. However, for monthly estimates in major cuts, the Project Engineer may take a profile

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION

through the cut with the elevations plotted on the cross sections. Using a level template, the area can be planimetered and boarded to determine the quantity. The final quantity for the cut would be determined from cross-section by the Average End Area (or other acceptable) method. The quantities paid on each estimate from each cut should be noted on the cross-section sheets. The Project Engineer may estimate the percentage of the total quantity taken from each cut during the estimate period if cross-sections are not available. These computations must be shown on the Cross Section Sheets.

(2) Submit cross-sections, computer quantity sheets, and field books containing original and final cross-section notes. Include a tabulation showing quantities from the main roadway (left and right lanes), service roads, tail ditches, intersecting roads, etc., and grand total. Show total on Summary of Quantities Sheet.

(3) Make a visual check of the cross-sections. Plot the final profile on the plan-profile sheets as a check on the centerline profile elevations. Check the plotting of any irregularly shaped sections using the original and final cross-section. Check planimetering, boarding and totals. If computer method is used, cross-sections and calculations should be spot-checked to assure that the quantities are correct.

210-B CYIP 0 CHANNEL EXCAVATION

(1) Quantities shall be computed from cross-sections by the Average End Area (Or other acceptable) Method. Each ditch or channel designated on the plans should be cross-sectioned and plotted on cross-section sheets. Quantities paid on each estimate should be noted on the cross-section sheets.

(2) Submit cross-section sheets, field books containing original and final cross-section notes, and show tabulation of quantities for each channel on the Summary of Quantities Box Sheet. Show grand total on Summary of Quantities Sheet.

(3) Check against the original plans to see if each channel was designated for Channel Excavation. Make a visual check of the cross-section. Check the plotting of any unusual shaped sections. Check planimetering, boarding and totals.

210-C CYIP 0 MUCK EXCAVATION

(1) Quantities shall be computed by the use of the modified cross-section and Average End Area (Or other acceptable) Method described in Article 210.09. Each Muck area shall be cross-sectioned and plotted on cross-section sheets. Quantities paid for on each Estimate should be so noted on the cross-section sheets.

(2) Submit cross-section sheets and field books containing original and final cross-section notes. Show grand total on Summary of Quantities Sheet.

(3) Make a visual check of the cross-sections. Check the plotting of any unusual shaped sections. Check planimetering, boarding and totals.

210-D CYIP 0 BORROW EXCAVATION

210-E CYIP 0 BORROW EXCAVATION

Note! Specify either Underwater Backfill or Underwater Embankment

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION

(1) Cross-sections should be taken and quantities calculated on all borrow areas where significant quantities are being removed. Average depths and areas may be used to estimate smaller quantities. The method of computation should be so noted on the cross section sheets. Care should be taken to avoid overpayment and corrections should be made when the cross-sections are taken. Indicate on the cross-section sheets the quantities paid on each Estimate.

(2) Submit cross-section sheets and field books containing original and final cross-sections. Submit computer quantity sheets if the computer section services are used. Show grand total on the Summary of Quantities Sheets.

(3) Make a visual check of the cross-sections. Check the plotting of any unusual shaped sections. Check planimetering, boarding and totals. If computer method is used spot-check cross-sections and calculations to assure that the quantities are correct.

210-F TIP 0 BORROW EXCAVATION

Note! Specify Underwater Backfill or Underwater Embankment

(1) Weight Tickets shall be totaled and totals posted daily on a Tabulation Sheet. A running total should be kept to date. The total to date used for each Monthly Estimate should be noted on the Tabulation Sheet.

(2) Submit Weight Tickets and Tabulation Sheets. Show total on Summary of Quantities Sheet.

(3) Use Weight Tickets to verify the daily totals on the Tabulation Sheet and the total on the Summary of Quantities Sheet.

212-A STATION 2 MACHINE GRADING SHOULDERS

(1) Show in field book station to station completed each day and stations completed to date. Indicate in book estimate paid on.

(2) Submit field book and show grand total from it on Summary of Quantities Sheet. Show reference on Summary of Quantities Sheet where backup data can be found.

(3) Check field book measurements and verify totals shown on Summary of Quantities Sheet.

214-A C.Y. 0 STRUCTURE EXCAVATION

(1) Refer to Determine quantities from cross-sections using Average End Area Method. Indicate on the Drainage Sheets the estimate number on which payment is made. Refer to example contained herein.

(2) Submit Drainage Sheets, Minor Structure Books and Summary of Quantities Box Sheets. Show total on Summary of Quantities Sheet.

(3) Check cross-sections using field notes. Verify length and width of excavation. Check planimetering, boarding and totals. Check total for each structure on the Box Sheet and the grand total on the Summary of Quantities Sheet.

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION
214-B	**C.Y.**	**1**	**FOUNDATION BACKFILL,** ***LOCAL/COMMERCIAL***

(1) Quantity is 150% of volume of excavation it replaces. Determine excavation from cross-sections. Indicate on the Drainage Sheets the estimate number on which the payment is made. **(Refer to Plates D, E, F & G contained herein)**.

(2) Submit Drainage Sheets, Cross-section notes and Summary of Quantities Box Sheets. Indicate quantity for each structure. Show grand total on Summary of Quantities Box Sheet.

(3) Check cross-sections with field notes. Verify length and width of excavation. Check planimetering, boarding and totals. Be sure that the excavation necessary for placing the Foundation Backfill is included in the total for Structure Excavation.

215-A	**C.Y.**	**2**	**UNCLASSIFIED BRIDGE EXCAVATION**

(1) Take and plot cross-sections of ground. Plot elevation of bottom of excavation and compute excavation in accordance with Section 215. For incomplete excavation each month get approximate elevation and compute to that point. Show estimate paid on.

(2) Submit field books, cross-sections and computations. Show totals on box sheets. Show grand total on Summary of Quantities Sheet. Show on Summary of Quantities Sheets as to where backup data for total can be found.

(3) Cross-sections are checked using the field book. After all sections have been checked, areas are planimetered and volume computed. A further check is made assuring that all footing dimensions agree with plan and specification requirements for each structure involved.

215-B	**LUMP SUM**	**0**	**COFFERDAMS OR SHEETING AND SHORING, _*_, _*_*_** **** Station Number, Bridge Number, Ramp Number, etc.*** ***** Lane if Applicable***

(1) The Project Engineer shall pay a percentage of the contract price based on the estimated percentage of the total work performed on each unit as estimated by the Engineer. In making this estimate each pier or bent considered as part of a unit will be given an equal percentage of the total. Upon completion of the foundation above ground line at a particular pier or bent, that percentage of the total unit may be paid. Show on plan-profile sheets and list each unit in a field book showing location, description, date work began, date completed and amounts paid on each estimate.

(2) The units should be shown on plan profile sheets, which become part of the final estimate data. Each complete or partially constructed unit should be blocked and shown for each estimate period and the percentage complete indicated. List total on Summary of Quantities Sheet.

(3) Check and compare final quantity with total shown on Summary of Quantities Sheet.

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION
217-A	L.F.	1	ROCK BOLTING, 1" SLOTTED
217-B	L.F.	1	ROCK BOLTING, 5/8" HEADED
217-C	L.F.	1	ROCK BOLTING, 3/4" HEADED
217-D	L.F.	1	ROCK BOLTING, 7/8" HEADED
217-E	C.Y.	2	SEAM SEALANT
217-F	GALLON	0	ASPHALT SURFACING
217-G	S.Y.	1	PNEUMATIC CONCRETE BLANKET, _____INCHES THICK.

(1) Put field measurements in field book and make necessary calculations and sketches in field book or on cross-section sheets. For Asphalt Surfacing, show temperature, gallons used and gallons at 60°F. Show estimate paid on in field book or on cross-section sheets.

(2) Submit field book containing measurements, and sketches. Show calculations in field book or on cross-section sheets. Show grand total from calculations on Summary of Quantities Sheet. Show reference on Summary of Quantities Sheet where backup data for total can be found.

(3) The measurements made in the field are checked and compared with the sketches and all calculations are then checked and compared with the total on the Summary of Quantities Sheet.

219-A	TON	0	ROCK BUTTRESS FOR LANDSLIDE CORRECTION
219-E	TON	0	SPECIAL BACKFILL FOR LANDSLIDE CORRECTION

Note! *(1) (2) (3) SAME AS FOR ITEM 224-C.*

219-B	L.F.	1	SPECIAL UNDERDRAIN_____ INCH DIAMETER
219-C	S.Y.	1	SPECIAL FILTER BLANKET, __*__ (**)
219-D	L.F.	1	HORIZONTAL DRAIN_____INCH DIAMETER

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION
219-F	**C.Y.**	**0**	**SPECIAL BACKFILL FOR LANDSLIDE CORRECTION**

**** Specify either Aggregate or Fabric.***
*(**)* ***If Fabric, specify either Woven or Non-woven.***

(1) Put field measurements in field book and make necessary calculations and sketches in field book. Take and plot original and final cross sections of special backfill sources. Show estimate paid on in field book or on cross section sheets.

(2) Submit field book and cross section sheets. Show grand total from calculations on Summary of Quantities Sheet. Show reference on Summary of Quantities Sheet where backup data for total can be found.

(3) Field book measurements are checked against final totals. Cross sections of special backfill sources are checked.

224-A	**C.Y.**	**1**	**LIME SINK EXCAVATION**

(1) Cross-section if possible or use best method available for computing depending on shape of sink. Show computations on cross-sections and/or in field book. Partially excavated sinks may be estimated for monthly estimates. Show estimate paid on in field book or on cross-section sheets.

(2) Submit cross-sections, field books and/or computations. Show totals on box sheets or computation sheets and grand total on Summary of Quantities Sheet. Show reference on Summary of Quantities Sheet where backup data for total can be found.

(3) Cross-sections are checked using the field book. Areas are planimetered and volumes computed. Compared with Summary of Quantities Sheet.

224-B	**C.Y.**	**2**	**SPECIAL BACKFILL FOR LIME SINK *(Type Material)***

(1) Record truck bed measurements, total haul tickets daily and show totals on tabulation sheet by dates with daily and to-date totals. Indicate on tabulation sheet monthly estimate paid on.

(2) Submit truck measurements, haul tickets and tabulation sheets. Show grand total from tabulation sheet on Summary of Quantities Sheet. Show reference on Summary of Quantities Sheet where backup data for total can be found.

(3) Check truck capacity computations. Check haul tickets for date, truck number, signature, capacity, number of loads, material source, type material, total cubic yards.

224-C	**TON**	**2**	**SPECIAL BACKFILL FOR LIME SINK *(Type Material)***

(1) Total weight tickets daily and bind by dates. Show totals on tabulation sheet by dates with daily and to-date totals. Indicate on tabulation sheet monthly estimate paid on.

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION

(2) Submit weight tickets and tabulation sheets. Show grand total from tabulation sheets on Summary of Quantities Sheet. Show reference on Summary of Quantities Sheet where backup data for total can be found.

(3) Check weight tickets and compare with tabulation and Summary of Quantities Sheets.

224-D	**C.Y.**	**2**	**CONCRETE SEAL FOR LIME SINK**

(1) Compute volume of concrete placed by best available method depending on shape and size of sink. Show measurements and computations in field book and on cross-section sheets if needed. Indicate monthly estimate paid on. Show total on monthly estimate register.

(2) Submit field book and cross-section sheets showing measurements and computations. Show grand total from field book or cross-section sheets on Summary of Quantities Sheet. Show reference on Summary of Quantities Sheet where backup data can be found.

(3) Check computations in field book with plan dimensions, approved revisions and box sheet total.

230-A	**ROADBED STATION**	**2**	**ROADBED PROCESSING**

(1) Show in field book station to station completed each day and stations completed to date. Indicate in book estimate paid on.

(2) Submit field book and show grand total from it on Summary of Quantities Sheet. Show reference on Summary of Quantities Sheet where backup data for total can be found.

(3) Check field books measurements and verify totals shown on Summary of Quantities Sheet.

231-A	**C.Y.**	**2**	**ROADBED STABILIZING MATERIAL** ***(Type Material)***

(1) Record truck bed measurements, bind haul cards by date and show totals on tabulation sheets by date with daily and to-date totals. Show estimate no. paid on tabulation sheet.

(2) Submit truck measurements, haul cards, and tabulation sheets. Show total from tabulation sheets on Summary of Quantities Sheet. Show reference on Summary of Quantities Sheet where back-up data for total may be found.

(3) Check truck bed capacity calculations. Check haul tickets for date, truck number, signature, capacity, number of loads, material source, type material, total cubic yards, etc. Check tickets against tabulation sheet and Summary of Quantities Sheet.

231-B	**TON**	**1**	**ROADBED STABILIZING MATERIAL** ***(Type Material)***

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION

(1) Bind weight tickets by date and show daily and to-date totals on tabulation sheet. Show estimate no. paid on tabulation sheet

(2) Submit weight tickets, bound by date and tabulation sheets. Show grand total from tabulation sheets on Summary of Quantities Sheet. Show reference on Summary of Quantities Sheet where back-up data for total can be found.

(3) The weight tickets are checked with the postings to the tabulation and Summary of Quantities Sheet.

232-A	**S.Y.**	**2**	**LIME STABILIZATION, CLASS_____ , _____ INCHES THICK**

(1) Show actual measurements in field book and any necessary sketches on cross-section sheets. Mark estimate number paid in field book.

(2) Submit field book and sketches. Show total from field book on Summary of Quantities Sheet. Show reference on Summary of Quantities Sheet where back-up data for total can be found.

(3) Check sketches against field book and compare with Summary of Quantities Sheet.

232-B	**TON**	**2**	**LIME**

(1) Bind delivery tickets for each month and show totals on tabulation sheet by month, monthly total and to-date total. Show estimate paid on tabulation sheet.

(2) Submit delivery tickets and tabulation sheet. Show grand total from tabulation sheet on Summary of Quantities Sheet. Show reference on Summary of Quantities Sheet where backup data for total may be found.

(3) Check tickets against tabulation sheet and compare with Summary of Quantities Sheet.

235-A	**LUMP SUM**	**0**	**DETOUR BRIDGE AT STA._____ (See Details Sheet No. _____)**

(1) Project Engineer will estimate percent complete to date monthly and basis for estimate will be shown on a sheet to be placed in monthly estimate file.

(2) Show on original detail sheet as 100% complete. Show on Summary of Quantities Sheet and make reference on it as to location of detail sheet in final plan assembly.

(3) Check the totals for each item listed in the field book and check against the original plans and compare with the totals on the summary of quantities and box sheets.

301-A	**SQ.YD. COMP. IN PLACE**	**1**	**1, 2, COURSE, TYPE 3, 4, 5 MIXED, ___ INCHES COMPACTED THICKNESS**

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION

1. ***Base Classification (Selected Materials, etc., Granular Soil, Soil Aggregate, Processed Reef Shell, Crushed Aggregate).***
2. ***Base or Subbase.***
3. ***Type***
4. ***Insert, "with cement additive" if required.***
5. ***Road, Yard, or Plant.***

(1) For monthly estimate where final calculations and measurements have not been made, calculations may be made based on plan or directed widths and roadbed station lengths with these calculations shown on a sheet to be placed in the monthly estimate file. Final calculations are to be made from plan or directed widths of placement and actual length measurements, which are placed in field books. Any sketches required and the calculations should be shown in field books and/or on cross-section sheets. Mark estimate number paid in field book or on cross-section sheets.

(2) Submit field books and cross-section sheets with sketches and calculations. Show page totals and grand total on Summary of Quantities Sheet. Show reference on Summary of Quantities Sheet where back-up data for total may be found.

(3) The measurements made in the field are checked and compared with the special detailed drawings and all calculations are then checked and compared with the total on the Summary of Quantities Sheet

301-B	**CU. YD. COMP. IN PLACE**	**1**	**1, 2, Course, TYPE 3, 4, 5 MIXED**
			(See Item 301-A for Numerical Selection)
305-A	**CU YD. COMP. IN PLACE**	**1**	**___*___ , __**___ , FOR MISCELLANEOUS USE**

* ***Specify Kind of Material***
Borrow, Section 210
Selected Materials, Section 820
Granular Soil, Section 821
Drainage Plane, Section 822
Soil Aggregate, Section 823
Processed Reef Shell, Section 824
Crushed Aggregate, Section 825

** ***Specify Type of Material***

(1) Record truck bed measurements, bind haul cards by date and show totals on tabulation sheets by date with daily and to-date totals. Show estimate number paid on tabulation sheet.

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION

(2) Submit truck measurements, haul cards and tabulation sheets. Show total on Summary of Quantities Sheet. Show reference on Summary of Quantities Sheet where back-up data for total may be found.

(3) Check truck bed capacity calculations. Check haul tickets for date, truck number, signature, capacity, number of loads, material source, type of material, total cubic yards, etc. Check tickets against tabulation sheet and Summary of Quantities Sheet.

301-C	**TON**	**2**	**CEMENT**
301-D	**TON**	**2**	**LIME**
301-E	**TON**	**2**	**1, 2 COURSE, TYPE 3, 4, 5 MIXED**

(See Item 301-A for Numerical Selection)

(1) Bind vendors delivery tickets monthly. Show totals on tabulation sheets by monthly and to-date totals. Mark estimate paid on tabulation sheet.

(2) Submit delivery tickets and tabulation sheets. Show total from tabulation sheets on Summary of Quantities Sheets. Show reference on Summary of Quantities Sheet where back-up data for total may be found.

(3) Check tickets and compare with tabulation and Summary of Quantities Sheet.

305-B	**TON COMP. IN PLACE**	**1**	**___*___ ___**____ FOR MISCELLANEOUS USE**

***** ***See Section 305-A***
****** ***See Section 305-A***

(1) Bind weight tickets by date and post totals by date on tabulation sheets. Mark estimate no. paid on tabulation sheets.

(2) Submit weight tickets and tabulation sheets. Show grand total from tabulation sheets on Summary of Quantities Sheet. Show reference on Summary of Quantities Sheet where back-up data for total may be found.

(3) Check haul tickets for date, truck number, signature, capacity, number of loads, material source, type material, total tons, etc. Check tickets against tabulation sheet and Summary of Quantities Sheet.

306-A	**EACH**	**0**	**PORTABLE NUCLEAR MOISTURE DENSITY TESTING DEVICE**
306-B	**EACH**	**0**	**STATE RETAINED PORTABLE NUCLEAR MOISTURE DENSITY TESTING DEVICE**

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION
306-C	**EACH**	**0**	**NUCLEAR THIN LAYER DENSITY TESTING DEVICE**
306-D	**EACH**	**0**	**STATE RETAINED NUCLEAR THIN LAYER DENSITY TESTING DEVICE**
306-E	**EACH**	**0**	**STATE RETAINED PORTABLE NUCLEAR MOISTURE-DENSITY TESTING DEVICE (Includes Disposal of Existing Device)**
306-F	**EACH**	**0**	**STATE RETAINED NUCLEAR THIN LAYER TESTING DEVICE (Includes Disposal of Existing Device)**

(1) When unit arrives on project, inspect for compliance with specifications. Place in field book description of unit and statement that it meets specifications. Mark in field book estimate paid.

(2) Submit field book. Show on Summary of Quantities Sheet. Show on Summary of Quantities Sheet where back-up data may be found.

(3) Check for entry in field book.

315-A	**SQ. YD. COMP.IN PLACE**	**1**	**DRAINAGE PLANE MATERIAL_____ INCHES THICK**

(1) For monthly estimates where final calculations have not been made, calculations may be based on plan or directed widths and roadbed station lengths with these calculations shown on a sheet to be placed in the monthly estimate file. Final calculations are to be made from plan or directed widths of placements and actual length measurements, which are placed in field books. Any sketches required and the calculations should be shown in field books and/or on cross-section sheets. Mark estimate number paid in field books or on cross section sheets.

(2) Submit field books and cross-section sheets with sketches and calculations. Show page totals and grand total in books or on sketches. Show grand total on Summary of Quantities Sheet. Show reference on Summary of Quantities Sheet where back-up data for total may be found.

(3) The measurements made in the field are checked and compared with the sketches and all calculations are then checked and compared with the total on the Summary of Quantities Sheet.

327-A	**TON**	**2**	**PLANT MIX BITUMINOUS BASE MIX_____**
327-B	**TON**	**2**	**PLANT MIX BITUMINOUS BASE PATCHING, MIX_____**
327-C	**TON**	**2**	**PLANT MIX BITUMINOUS BASE LEVELING, MIX_____**
327-D	**TON**	**2**	**PLANT MIX BITUMINOUS BASE WIDENING, MIX_____**

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION
327-E	**TON**	**2**	**PERMEABLE ASPHALT TREATED BASE** ***Note!*** ***Comments 1, 2, and 3 same as item Nos. 424 & 429***
401-A	**SQ. YD. COMP IN PLACE**	**0**	**BITUMINOUS TREATMENT TYPE DESIGNATE LETTER/ LETTERS, TYPE OF BITUMEN, IF SPECIFIED**
401-B	**SQ. YD. COMP IN PLACE**	**0**	**BITUMINOUS TREATMENT TYPE DESIGNATE LETTER/ LETTERS, TYPE OF BITUMEN, IF SPECIFIED (WITH POLYMER ADDITIVE)**

(1) Take measurements and place in field book. Make sketches in field book and/or on cross-section sheets if needed. Show calculations in field book and/or on cross-section sheets with sketches. Show totals in book and/or on cross-section sheets and indicate on which estimate number payment was included. Measurements and calculations for Bituminous Placement Reports may be used for monthly payment if final measurements and calculations have not been made.

(2) Submit field books and sketches with calculations and totals. Show grand total on Summary of Quantities Sheet. Show reference on Summary of Quantities Sheet as to where back-up data for total can be found.

(3) The field book and sketches are checked showing where the material was placed along with all necessary calculations for computing the quantity recorded on the Summary of Quantities Sheet.

402-A	**S.Y.**	**0**	**SLURRY SEAL COAT, TYPE _*_** * ***INDICATE I OR II***

(1) Take measurements and record in field book. Make sketches in field book and/or on cross-section sheets if needed, show calculations with sketches. Show totals in book and/or on cross-section sheets and indicate on which estimate payment was included.

(2) Submit field books and sketches with calculations and totals. Show grand total on Summary of Quantities Sheet. Show reference on Summary of Quantities Sheet as to where back-up data for total can be found.

(3) The field book and sketches are checked showing where the material was placed along with all necessary calculations for computing the quantity recorded on the Summary of Quantities Sheet.

405-A	**GALLON**	**0**	**TACK COAT**

(1) Show in field book where placed, temperature, gallons used and gallons at 60 °F. Total gallons at 60° F. monthly and indicate estimate number paid on.

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION

(2) Submit field book and show grand total from same on Summary of Quantities Sheet. Show reference on Summary of Quantities Sheet as to where back-up data for total may be found.

(3) Check temperature correction calculations in field book to verify total on Summary of Quantities Sheet.

408-A	**SQ. YD.**	**1**	**PLANING EXISTING PAVEMENT APPROXIMATELY___*___INCHES THRU__**__ INCHES THICK**

**** Lower limit of approximate thickness to be removed***
***** Upper limit of approximate thickness to be removed***

(1) Take measurements and record in field book. Make sketches in field book and/or on cross section sheets if needed, show calculations with sketches. Show totals in book and/or on cross section sheets and indicate on which estimate payment was included.

(2) Submit field book and sketches with calculations and totals. Show grand total on Summary of Quantities Sheet. Show references on Summary of Quantities Sheet as to where backup data for total can be found.

(3) The field measurements are checked and compared with the sketches and all calculations are then checked and compared with the total on the Summary of Quantities Sheet.

410-A	**EACH**	**0**	**PROFILOGRAPH, __*__**
410-B	**EACH**	**0**	**STATE FURNISHED PROFILOGRAPH**
410-C	**EACH**	**0**	**CONTRACTOR RETAINED PROFILOGRAPH**
410-H	**EACH**	**0**	**MATERIAL REMIXING DEVICE**

**** Specify Type, "Truss" or "Beam", If Applicable***

(1) When unit arrives on project, inspect for compliance with specifications. Place in field book description of unit, make, model, and serial no. and statement that it meets specifications. Mark in field book estimate number on which paid.

(2) Submit field book. Show on Summary of Quantities Sheet. Show on Summary of Quantities Sheet where backup data may be found.

(3) Check for entry in field book.

420-A	**TON**	**2**	**OPEN GRADED FRICTION COURSE, MIX___*___**

****…Specify "1" or "2"***

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION
424-A	TON	2	SUPERPAVE BITUMINOUS CONCRETE WEARING SURFACE LAYER, _*_*_, _*_*_*_ MAXIMUM AGGREGATE SIZE MIX, ESAL RANGE _*_*_*_*_ -PER TON
424-B	TON	2	SUPERPAVE BITUMINOUS CONCRETE __*__ BINDER LAYER, _*_*_, _*_*_*_ MAXIMUM AGGREGATE SIZE MIX ESAL RANGE _*_*_*_*_- PER TON
424-C	TON	2	SUPERPAVE BITUMINOUS CONCRETE BASE LAYER, _*_*_, _*_*_*_ MAXIMUM AGGREGATE SIZE MIX, ESAL RANGE _*_*_*_*_ -PER TON ** Specify either "Upper "or" Lower* *** Specify "Patching", "Leveling", "widening" etc. only when required.* **** Specify Maximum Aggregate size ½, ¾, 1, or 1.5* ***** Specify "A", "B", "C", "D", "E", or "F*
429-A	TON	2	IMPROVED BITUMINOUS CONCRETE WEARING SURFACE LAYER, _*_*_, _*_*_*_ MAXIMUM AGGREGATE SIZE MIX, ESAL RANGE _*_*_*_*_-PER TON
429-B	TON	2	IMPROVED BITUMINOUS CONCRETE _*_ BINDER LAYER, _*_*_, _*_*_*_ MAXIMUM AGGREGATE SIZE MIX, ESAL RANGE _*_*_*_*_ -PER TON
429-C	TON	2	IMPROVED BITUMINOUS CONCRETE BASE LAYER, _*_*_, _*_*_*_ MAXIMUM AGGREGATE SIZE MIX, ESAL RANGE _*_*_*_*_ PER TON ** Specify "Upper" only when required* *** Specify " Patching", "Leveling," "Widening", etc. only when required* **** Specify Maximum Aggregate Size ½, ¾, 1, or 1.5* *****Specify "A", "B", "C", "D", "E", "F", or "G"*

(1) Bind weight tickets by date. (Show totals on tabulation sheets by date with daily and to-date totals.) Patching, Leveling and Widening tickets to be marked as such and shown separately. Show estimate number paid on tabulation sheets. Show totals in field book by date.

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION

(2) Submit weight tickets, tabulation sheets and field book. Show total from weigh tickets, tabulation sheets and field book on Summary of Quantities Sheet. Show reference on Summary of Quantities Sheet where backup data for total may be found.

(3) Check vendor's delivery (weight) tickets and daily tabulation and field book for total tons used. Check rate of placement reports and field book.

428-A	**L.F.**	**0**	**SCORING BIT. PAVEMENT SURFACE**

(1) Show in field book the location by station number, lane, shoulder etc. Show date performed and measured length. Indicate the estimate number paid on.

(2) Submit field book containing quantities. Show total on Summary of Quantities Sheet. Show reference on Summary of Quantities Sheet where backup data for the total can be found.

(3) Check field book measurements and totals against Summary of Quantities Sheet.

430-A	**CU.YD. COMP. IN PLACE**	**1**	**SOIL TYPE SURFACING (Kind of material)**

(1) Record truck bed measurements, and bind haul cards by date. Show estimate no. paid on bound tickets.

(2) Submit truck measurements, and haul cards. Show total on Summary of Quantities Sheet. Show reference on Summary of Quantities Sheet where back up data for total may be found.

(3) Check truck bed capacity calculations. Check haul tickets for date, truck number, signature, capacity, number of loads, material source, type material, total cubic yards, etc.

430-B	**TON COMP. IN PLACE**	**1**	**AGGREGATE SURFACING (ALDOT Size of Material)**

(1) Bind weight tickets by date and post totals on bound tickets. Mark estimate no. on which paid on bound tickets.

(2) Submit weight tickets. Show grand total on Summary of Quantities Sheet. Show reference on Summary of Quantities Sheet where back-up data for total may be found.

(3) Check haul tickets for date, Truck number, signature, capacity, number of loads, material source, type material, total tons, etc. Check tickets against Summary of Quantities Sheet.

450-A	**SQ.YD.**	**0**	**_*_, CEMENT CONCRETE PAVEMENT, _____INCHES THICK.**
450-B	**SQ.YD.**	**2**	**REINFORCED CEMENT CONCRETE BRIDGE END SLAB**
450-C	**LIN.FT.**	**2**	**INTEGRAL CURB**

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION
			_*_ ***Use appropriate description*** ***Plain, Reinforced, Plain High Early Strength, Continuous Reinforced, Reinforced High Early Strength.***

(1) Put field measurements in field book and make necessary calculations and sketch in field book or on cross-section sheets. Show estimate paid on in field book or on cross-section sheets. Where final field measurements have not been completed the calculations made for the daily concrete report may be used and the estimate paid on marked on the report.

(2) Submit field book containing measurements and sketches and calculations in field book or on cross-section sheets. Show grand total from calculations on Summary of Quantities Sheet. Show reference on Summary of Quantities Sheet where back-up data for total can be found.

(3) The field book and special drawings are checked showing where the material was placed, along with all necessary calculations for computing the quantity recorded on the Summary of Quantities Sheet.

450-E	**EACH**	**0**	**PROFILOGRAPH**
450-F	**EACH**	**0**	**STATE FURNISHED PROFILOGRAPH**
450-G	**EACH**	**0**	**CONTRACTOR RETAINED PROFILOGRAPH**

(1) When unit arrives on project, inspect for compliance with specifications. Place in field book description of unit, make, model and serial no. and statement that it meets specifications. Mark in field book estimate paid.

(2) Submit field book. Show on Summary of Quantities Sheet. Show on Summary of Quantities Sheet where backup data may be found.

(3) Check for entry in field book.

452-A	**PER BAG (94 #)**	**0**	**PORTLAND CEMENT PRESSURE GROUT FOR SLAB JACKING**

(1) Record in field book by date, location being worked on, bags of cement used for each location. Put necessary notes and field measurements in field book. Show quantity calculations and sketches in field book or on cross-section sheets. Show estimate paid on in field book or on cross section sheets.

(2) Submit field book and cross-section sheets containing quantities, field measurements, calculations, and sketches. Show grand total from calculations on Summary of Quantities Sheet. Show reference on Summary of Quantities Sheet where back-up data for the total can be found.

(3) Check field books, measurements, and sketches against quantity calculations. Check the computed quantities against the Summary of Quantities Sheet.

453-A	**EACH**	**0**	**DRILL HOLES**

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION
453-B	PER BAG (94 #)	0	PORTLAND CEMENT PRESSURE GROUT
453-C	S.Y.	2	REMOVAL OF CONCRETE PAVEMENT SLAB
453-D	C.Y.	2	CONCRETE PAVEMENT REPLACEMENT SLAB
454-A	L.F.	1	CLEANING & SEALING CONCRETE PAVEMENT, TYPE _*_, _*_*_ -per L. F. ** Specify I or II* *** Specify Joints or Cracks*
454-B	L.F.	1	WATERPROOFING PAVEMENT-JOINTS & CRACKS
454-C	S.F.	1	REPAIRING TYPE 1 CONCRETE PAVEMENT SPALLS, FULL DEPTH
454-D	S.F.	1	REPAIRING TYPE 1 CONCRETE PAVEMENT SPALLS, PARTIAL DEPTH
455-A	S.Y.	1	GRINDING CONCRETE PAVEMENT

(1) Record in field book by date, the slab numbers being worked on, and no. of drill holes per slab, bags of cement used for each group of slabs grouted. For S.Y., C.Y., Lane-mile, L.F. & S.F. items, put necessary field measurements in field book. Show quantity calculations and sketches in the field book or on cross-section sheets. Show estimate paid on in field book or on cross-section sheets.

(2) Submit field book and cross-section sheets containing quantities, field measurements, calculations & sketches. Show grand total from calculations on Summary of Quantities Sheet. Show reference on Summary of Quantities Sheet where back-up data for the total can be found.

(3) Check field books measurements and sketches against quantity calculations check the computed quantities against the Summary of Quantities Sheet.

502-A	Pound	0	STEEL REINFORCEMENT
502-B	Lump Sum	0	STEEL REINFORCEMENT FOR BRIDGE SUPERSTRUCTURE, _*_, _*_*_, _*_*_*_

** Station No., Bridge, No., Ramp No., etc*
*** Lane, if applicable*
**** Approximate quantity of reinforcing steel in pounds*

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION

(1) Indicate on Vendor's shipping list steel used for current month and estimate number paid on. Make sketches and indicate on same lengths and size of bars used in special feature not covered by plan drawings.

(2) Submit vendor's shipping list and sketches. Show totals for individual structures on box sheets. Show grand total on Summary of Quantities Sheets. Show reference on Summary of Quantities Sheets where back up data can be found.

(3) Check the vendor's shipping list and the postings to various box sheets for the different structures involved. Check the box sheet total and the total on the Summary of Quantities Sheet.

503-A	**Cu. Yd.**	**2**	**SEAL CONCRETE**

(1) Bind concrete delivery tickets by dates and footings and attach sheet to bundles showing dates poured, waste if any, bent and footing number, total C.Y paid for, and estimate number paid on. Show total on monthly estimate register.

(2) Submit concrete delivery tickets with sheets attached. Show totals on structure box sheets and grand total on Summary of Quantities Sheets. Show reference on Summary of Quantities Sheet where back up data can be found.

(3) Check concrete delivery tickets against bundle sheet totals, making sure waste has been taken out. Check totals on box sheets and Summary of Quantities Sheets.

503-B	**Lump Sum**	**0**	**COFFERDAM AND PUMPING, PIER NO _____ BENT NO._____**

(1) Show in field book percent complete for each cofferdam and pay on estimate in accordance with Item 503.05(a)2 of Specifications. Show estimate number paid on.

(2) Submit field book. Indicate on structure box sheets cofferdams as 100% complete. Show totals on Summary of Quantities Sheets. Show reference on Summary of Quantities Sheets where back up data for total can be found.

(3) Check plans for the designated pier or bent to be set up for cofferdam and check field book submitted.

503-C	**Lin. Ft.**	**1**	**CORE DRILLING SEAL CONCRETE FOOTINGS**

(1) As drilling is performed keep record of boring in field book. Show location by Structure, Bent, Pier and approximate Pier surface location. Indicate in field book estimate number paid on.

(2) Submit field book. Show totals by Pier and Bent on structure box sheets. Show Grand Total on Summary of Quantities Sheets. Show reference on Summary of Quantities Sheets where back up data for total can be found.

(3) Check totals in field book and check box sheets and Summary of Quantities Sheet.

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION
505-A	**EACH**	**0**	**(Type) TEST PILES (Pile designation/size)**
505-B	**EACH**	**0**	**(Static/Dynamic) LOADING TESTS (Pile designation/size)**

(1) Complete test pile record form as pile is driven and prepare Load Test Sketch from field notes after Load Test is complete. Retain copy of these documents for estimate purposes. Indicate on documents estimate no. paid on.

(2) Submit copy of test pile record and load test record. Show totals on structure box sheets. Show grand totals on Summary of Quantities Sheets. Show on Summary of Quantities Sheets, reference where back up data can be found.

(3) Check test pile driving records to verify total on box and Summary of Quantities Sheet. For number of loading tests and additional stages of loading, check loading test record and graph.

505-C	**Lin. Ft.**	**2**	**(Type) PILING (Pile designation/size)**

(1) Prepare pile driving report form as piling is driven and show totals thereon by structure, bent, footing, pile number, etc. Retain copy of report for estimate purposes. Show estimate number paid on the report form.

(2) Submit pile driving report forms. Show totals on structure box sheets. Show grand total on Summary of Quantities Sheets. Show reference on Summary of Quantities Sheets where back up data for total can be found.

(3) On pile driving records, check information used to determine length of each pile. Check totals on records box sheet and Summary of Quantities Sheet.

505-E	**Lin. Ft.**	**2**	**PERMANENT STEEL SHEET PILING (Pile Designation/size)**
505-F	**Lin. Ft.**	**2**	**PERMANENT CONCRETE SHEET PILING (Width)**
505-H	**Lin. Ft.**	**1**	**PILOT HOLES**

(1) Keep driving record in field book showing location, type, size, length, cut off, etc. Make calculations in field book of Lin. Ft. in place. Show estimate number paid on in field book.

(2) Submit field book. Show totals on structure box sheets if applicable. Show grand total on Summary of Quantities Sheets. Show reference on Summary of Quantities Sheet where back up data for total can be found.

(3) Check the calculations shown in the field book and check totals against the box sheets and Summary of Quantities Sheet.

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION
506-A	**Lin. Ft.**	**1**	**DRILLED SHAFT EXCAVATION, __*__ DIAMETER**
506-B	**Lin Ft.**	**1**	**SPECIAL DRILLED SHAFT EXCAVATION, __*__ DIAMETER**
506-D	**Lin. Ft.**	**1**	**EXPLORATION BELOW DRILLED SHAFT**
506-F	**Lin. Ft.**	**1**	**PERMANENT DRILLED SHAFT CASING, __*__ DIAMETER**

(1) Record in field book by date and shaft number (Location). Put necessary notes on observations and field measurements in field book. Show measurements and sketches in field book or on cross-section sheets. Show estimate paid on in field book or on cross-section sheets.

(2) Submit field book and cross-section sheets containing quantities, field measurements, and sketches. Show grand total from Summary of Quantities Sheet. Show reference on Summary of Quantities Sheet where backup data can be found.

(3) Check field books, measurements and sketches against the Summary of Quantities Sheet.

506-C	**Lin. Ft.**	**1**	**DRILLED SHAFT CONSTRUCTION, __*__ DIAMETER, CLASS __**__ CONCRETE**

**** Specify diameter of shaft in feet and inches***
***** Specify either "DS1", "DS2" or "DS3"***

(1) Prepare drilled shaft pouring record as shaft is poured. Bind or place in folder concrete delivery tickets by date and shaft number and attach sheet, to bundles or tickets in folder, showing dates poured, waste, shaft number, total C.Y. paid for, and estimate number paid on. Show total on monthly estimate register.

(2) Submit concrete delivery tickets with sheets attached. Show totals on structure box sheets and grand total on Summary of Quantities Sheet where back-up data can be found.

(3) Check field books, measurements and sketches against quantity calculations. Check computed quantities against the Summary of Quantities Sheet.

505-G	**EACH**	**0**	**PILE POINTS (TYPE/SIZE)**
506-G	**EACH**	**0**	**CROSSHOLE SONIC LOGGING, __*__ DIAMETER**
507-A	**EACH**	**0**	**WIRE ROPE (Abutment/Bulkhead) ANCHOR ASSEMBLY**

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION
507-B	**EACH**	**0**	**PRESTRESSED CONCRETE (Abutment/Bulkhead) ANCHOR ASSEMBLY**

(1) When complete in place so indicate in field book and indicate estimate number paid on.

(2) Submit field book. Show on structure box sheets. Show grand total on Summary of Quantities Sheets. Show reference on Summary of Quantities Sheets where back up data for total can be found

(3) Check field book entries, totals on box sheet and Summary of Quantities Sheet.

508-A	**POUND**	**0**	**STRUCTURAL STEEL**
508-D	**POUND**	**0**	**STRUCTURAL STEEL (Except Field Painting)**

(1) Take quantities of each individual item from plans, shop drawings, etc. Make computations, using correct weight of steel from specifications or plan drawings, in field book showing any necessary sketches. Show estimate number paid on in field book.

(2) Submit Field Book, plans, shop drawings, sketches, etc. Show totals on structure box sheets. Show grand total on Summary of Quantities Sheets. Show reference on Summary of Quantities Sheets where back up data for total can be found.

(3) Check calculations using shop drawings and special drawings. Check total on box sheet and Summary of Quantities Sheet.

508-B	**EACH**	**0**	**STRUCTURAL STEEL SUPERSTRUCTURE, _*_, _*_*_, _*_*_*_ (Specialty Item)**
508-C	**SET**	**0**	**BEARING PLATES _*_*_*_*_**

(1) Show in field book when percentages of completion shown in specifications are reached and indicate estimate number paid on.

(2) Submit field book. Show totals on structure box sheets. Show grand total on Summary of Quantities Sheets. Show reference on Summary of Quantities Sheet where back up data for total can be found.

(3) Check entries in field book showing dates of completion of work and signature of inspector.

508-E	**lump Sum**	**0**	**FURNISHING, FABRICATION & INSTALLATION OF LADDERS**
508-F	**Lump Sum**	**0**	**BRIDGE DECK DRAINAGE SYSTEM**

**** Length of Continuous/Simple Span***
***** Lane, if applicable***

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION

****** Approximate Poundage of Steel***
******* If a specific type of bearing plate is required, so designate (Bronze or PTFE)***

(1) Indicate in field book percent of item complete each month and estimate number paid on.

(2) Submit field book showing 100% complete. Show totals on structure box sheets and grand totals on Summary of Quantities Sheets. Show reference on Summary of Quantities Sheets where back up data for total can be found.

(3) Check entries in field book showing dates of completion of work and inspectors signature.

509-A	**MBM**	**2**	**UNTREATED TIMBER**
509-B	**MBM**	**2**	**TREATED TIMBER** **(Type Preservative)**
509-C	**MBM**	**2**	**TREATED TIMBER** **(Any Preservative)** **(Salvaged Material)**

(1) Take dimensions from plans and make calculations in field book and include any necessary sketches therein. Show in field book estimate number paid on.

(2) Submit field book, sketches, plans, etc. Show totals on box sheets where applicable. Show grand total on Summary of Quantities Sheet. Show reference on Summary of Quantities Sheet where back up data for total can be found.

(3) Check the dimensions from the plans and check the calculations shown in the field book and special drawings. Verify total shown on Summary of Quantities Sheet.

510-A	**Cu. Yd.**	**2**	**BRIDGE SUBSTRUCTURE** **CONCRETE, CLASS A**
510-B	**Cu. Yd.**	**2**	**BRIDGE CONCRETE, CLASS ___**

(1) Quantities for monthly estimates may be taken from concrete placement reports, plan quantities or by calculations made preceding each pour and placed in a field book. Show monthly estimate paid on.

(2) On all items which remain unchanged from plan details use plan quantities. On items, which do change, revise plan sheets accordingly including any necessary sketches and field dimensions. Make calculations on revised plan sheet if space permits. Otherwise place on cross-section sheets. Show totals on structure box sheets. Show grand totals on Summary of Quantities Sheets. Show reference on Summary of Quantities Sheet where back up data for total can be found.

(3) Check calculations of revised plan sheets and cross-section sheets. Verify total on box sheets and Summary of Quantities Sheet.

510-C	**Lump Sum**	**0**	**BRIDGE CONCRETE SUPERSTRUCTURE** _*_, _*_*_, _*_*_*_,

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION

(1) Use daily concrete placement report C.Y. as compared to Approx. quantity shown on plans to obtain % complete each month. Show these calculations in field book and indicate the estimate number paid on.

(2) Show total on structure box sheets and indicate thereon as 100% complete. Show total from box sheets on Summary of Quantities Sheets. Show reference on Summary of Quantities Sheet where back up data for total can be found.

(3) Check entry-showing date of completion of work.

510-E	**SQ. Yd.**	**1**	**GROOVING CONCRETE BRIDGE DECKS** **** Station Number, Bridge Identification No. (BIN), Ramp No. Etc.*** ***** Lane, if applicable*** ****** Approximate quantity of superstructure concrete in cu. yds.***

(1) Put field measurements in field book and make any necessary calculation, and sketches. Show estimate paid on in field book.

(2) Submit field book containing measurements, sketches and calculations. Show grand total from calculations on Summary of Quantities Sheet. Show reference On Summary of Quantities Sheet where backup data for total can be found.

(3) The field book dimensions and calculations should be checked and verified with Summary of Quantities Sheet.

511-A	**EACH**	**0**	**ELASTOMERIC BEARINGS TYPE _*_** **** Bearing Type***
512-A	**EACH**	**0**	**PRECAST CONCRETE ABUTMENT CAPS, _____WIDE, BY _____ DEEP, BY _____LONG**
512-B	**EACH**	**0**	**PRECAST CONCRETE INTERMEDIATE BENT CAPS, _____WIDE, BY_____DEEP, BY_____LONG.**
512-C	**EACH**	**0**	**PRECAST CONCRETE TYPE _*_ SPAN SECTION, _____WIDE, BY_____DEEP, BY_____LONG**
512-D	**EACH**	**0**	**PRECAST CONCRETE _*_*_ SECTION, _____ LONG**

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION
512-E	EACH	0	PRECAST CONCRETE ABUTMENT PANELS, TYPE _____
512-F	EACH	0	PRECAST CONCRETE WING PANELS, TYPE _____
512-G	EACH	0	PRECAST CONCRETE ABUTMENT WING CAP PANELS

**** Types of Span Sections***
Type 1- Interior Span Section
Type 2A- Exterior Span Section for Curb A Section

Type 2B Exterior Span Section for Curb B Section
Type 2C Exterior Span Section for Barrier Rail
Type 2D Exterior Span Section with Curb D Section
Type 2E Exterior Span Section with Curb E Section

***** Types of Sections***
Curb A
Curb B
Barrier Rail Intermediate
Barrier Rail End

513-A	EACH	0	_*_ PRETENSIONED-PRESTRESSED CONCRETE GIRDERS, TYPE _*_*_ (Specialty Item)
513-B	L.F.	1	PRETENSIONED-PRESTRESSED CONCRETE GIRDERS, TYPE _*_*_ (Specialty Item)
513-C	EACH	0	PRESTRESSED CONCRETE INTERIOR SPAN SECTIONS, _____ WIDE, BY_____DEEP,BY_____LONG (Specialty Item)
513-D	EACH	0	PRESTRESSED CONCRETE EXTERIOR SPAN SECTIONS, _____ WIDE, BY_____ DEEP, BY_____ LONG (Specialty Item)

**** Length***
***** Type IM, IIM, IIIM, etc. as per AASHTO Classification.***

(1) In field book show dates and number erected and dates and number with deck and finish complete and pay on estimate in accordance with percentages shown in specifications. Show estimate number paid on.

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION

(2) Submit plans, standard drawings, shop drawings, etc. Show totals on structure box sheets. Show grand totals on Summary of Quantities Sheets. Show reference on Summary of Quantities Sheets where back-up data for total can be found.

(3) Check totals against plans and verify on Summary of Quantities Sheet.

515-A	**S.Y.**	**1**	**CLASS _____ WATERPROOFING**
515-B	**S.Y.**	**3**	**DAMPPROOFING**

(1) Make in place field measurements of area treated, place in field book, and calculate square yards. Show estimate number paid on.

(2) Submit field book, plans, standard drawings, etc. Show totals on structure box sheet, if applicable. Show grand totals on Summary of Quantities Sheets. Show reference on Summary of Quantities Sheet where back-up data for total can be found.

(3) Check sketches against plans, check calculations in field book and verify totals on Summary of Quantities Sheet.

517-A	**L.F.**	**1**	**_*_ HANDRAIL**
517-B	**L.F.**	**1**	**BEAM TYPE HANDRAIL (TYPE POSTS)**
517-C	**SET**	**0**	**(TYPE RAILING) - STAIR RAILING**
517-D	**L.F.**	**1**	**(ALUMINUM/GALVANIZED STEEL) SIDEWALK HANDRAIL**
			**** Galvanized Steel, Galvanized Steel Pipe, or Cast-In-Place Concrete***

(1) Submit field book, plans, standard drawings, special drawings, etc. Show totals on structure box sheets. Show grand totals on Summary of Quantities Sheets. Show reference on Summary of Quantities Sheet where back up data for totals can be found.

(2) Make in place measurements of completed item of handrail and place in field book. Also indicate number of sets of stair railing complete if applicable. Indicate estimate number paid on.

(3) Check the length and number of sets shown in field book with totals on box and Summary of Quantities Sheets.

520-A	**L.S.**	**0**	**REPAIRS TO EXISTING BRIDGE, STATION_____**
520-B	**L.S.**	**0**	**RAISING EXISTING BRIDGE, STATION_____**

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION
520-C	**L.S.**	**0**	**RAISING PORTION OF EXISTING BRIDGE, STATION _____**
521-A	**L.S.**	**0**	**COATING NEW BRIDGE AT STATION_____**
521-B	**L.S.**	**0**	**COATING EXISTING BRIDGE AT STATION_____**

(1) Indicate in field book percent of item complete each month and estimate number paid on.

(2) Submit field book showing 100% complete. Show totals on structure box sheets and grand totals on Summary of Quantities Sheets. Show reference on Summary of Quantities Sheets where back up data for total can be found.

(3) Check entries in field book showing dates of completion of work.

522-A	**L.F.**	**1**	**FURNISHING AND INSTALLING BRIDGE (INTERIOR OR END) JOINT SEAL SYSTEM _____ INCHES, TOTAL JOINT MOVEMENT**
522-B	**L.F.**	**1**	**FURNISHING AND PARTIAL INSTALLATION OF BRIDGE END JOINT SEAL SYSTEM _____ INCHES TOTAL JOINT MOVEMENT**
522-C	**L.F.**	**1**	**PARTIAL INSTALLATION OF BRIDGE END JOINT SEAL SYSTEM**
522-D	**Lump Sum**	**0**	**FURNISHING AND INSTALLING BRIDGE (INTERIOR OR END) JOINT SEAL SYSTEMS, STATION _____**
522-E	**Lump Sum**	**0**	**FURNISHING AND PARTIAL INSTALLATION OFBRIDGE END JOINT SEAL SYSTEMS, STATION _____**

(1) Show in field book by structure, station number, etc., and measure in place or show when complete if lump sum item. Indicate in field book estimate number paid on.

(2) Submit field book, plans, special drawings, shop drawings, standard drawings, etc. Show on structure box sheets. Show totals on Summary of Quantities Sheets and show reference where back-up data for total can be found.

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION

(3) Check special drawings and field book, then compare with box and Summary of Quantities Sheets.

524-A	**C.Y .**	**2**	**CULVERT CONCRETE _*_**
524-B	**C.Y .**	**2**	**CULVERT CONCRETE EXTENSION _*_**

**** Specify type, e. g. Precast or Cast-In-Place, only If applicable. Do not show a type in parentheses unless a particular type is specified on the plans.***

525-A	**C.Y.**	**2**	**RETAINING WALL CONCRETE**
525-B	**C.Y.**	**2**	**CONCRETE CRIBBING**

(1) Quantities shown on concrete daily placement reports or calculations made preceding each pour and placed in field book may be used for monthly estimates. Indicate on concrete report or in field book the estimate number paid on. Calculations made for final quantities may also be used for monthly estimates.

(2) Pay quantity shown on standard drawing or special drawing for concrete may be used without redrawing provided it was built as per standard or special drawing. However, this quantity should be checked. On miscellaneous items and items not built to standard, the structure should be drawn up and calculations shown in field book or on cross-section sheets or both using field measurements, and dimensions taken from plans, standard drawings, special drawing, culvert design sheets, etc. Show totals on structure box sheet. Show grand totals from structure box sheets on Summary of Quantities Sheets. Show reference on Summary of Quantities Sheets where back up data for total can be found.

(3) On structures built in accordance with the standards, check computations using correct constants from standards. On miscellaneous items, check special drawings and calculations. Verify totals on box and Summary of Quantities Sheets.

530-A	**L.F.**	**2**	**____ INCH ROADWAY PIPE, CLASS_*_BEDDING, _*_*_**
530-B	**L.F.**	**2**	**____ INCH SPAN, ____ INCH RISE ROADWAY PIPE, CLASS _*_ Bedding, _*_*_**

*** If other than Class "C" so note.**
**** Show acceptable types of pipe.**

531-A	**L.F.**	**2**	**_____INCH, _____INCH PLATE B.C. (If APPLICABLE), C.S OR C.A., P.I.. (If APPLICABLE), STRUCTURAL PLATE PIPE**

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION
531-B	L.F.	2	_____INCH SPAN, _____INCH RISE, _____INCH PLATE, B.C. (IF APPLICABLE) C.S. OR C.A. P.I. (IF APPLICABLE) STRUCTURAL PLATE ARCH PIPE
531-C	L.F.	2	_____INCH SPAN, _____INCH RISE, _____INCH PLATE, B.C. (IF APPLICABLE) C.S. OR C.A. Structural Plate Arch
532-A	L.F.	2	____INCH _*_ SLOTTED DRAIN (_*_*_) * *Specify "Bituminous Coated Corrugated Steel", "Concrete", "(Specify the Special Design)", etc., only if applicable.* ** *Specify "With Variable Height Grate", etc., if applicable.*
533-A	L.F.	2	_____ INCH STORM SEWER PIPE (*)
533-B	L.F.	2	_____ INCH SPAN, _____INCH RISE STORM SEWER PIPE (*) * *Show specific type if required.*
535-A	L.F.	2	_____ INCH SIDE DRAIN PIPE (*)
535-B	L.F.	2	_____ INCH SPAN, _____INCH RISE SIDE DRAIN PIPE (*) * *Show specific types, class or wall thickness, if required.*
536-A	L.F.	2	ROADWAY PIPE RELAID
536-B	L.F.	2	SIDE DRAIN PIPE RELAID

(1) Inspector to list in field book each pipe line by station, kind, size, skew, etc. and indicate date laid and length laid. Show in book the estimate number paid on. Also post on box sheets.

(2) Submit inspector's book noted in (1) above, box sheets, revised drainage sheets, etc. Show totals from inspector's book on revised drainage sheets and box sheets. Carry totals from box sheets to Summary of Quantities Sheets. Show reference on Summary of Quantities Sheets where back-up data for totals can be found.

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION

(3) Check drainage sheets with pipe book. Check box sheets totals from drainage sheets and verify Summary of Quantities Sheets.

600-A	**LUMP SUM**	**0**	**MOBILIZATION**

(1) Divide total amount performed to date on current estimate by contract amount and obtain percent complete. Show calculation in field book. As percent complete reaches levels shown in specifications, pay the percent of mobilization bid called for and show estimate number paid on.

(2) Show on Summary of Quantities Sheet as 100% complete when project is complete.

(3) Check final monthly estimate to verify Summary of Quantities Sheet.

601-A	**EACH**	**0**	**FURNISHING BASE, SOIL & STRUCTURE LABORATORIES**

(1) Show location, size, equipment, date delivered on project, etc. in field book. Show estimate number paid on in field book.

(2) Submit field book. Show totals on Summary of Quantities Sheets. Show reference on summary of quantity sheets where back-up data for total can be found.

(3) Check entries in field book and verify totals on Summary of Quantities Sheet.

602-A	**EACH**	**0**	**RIGHT OF WAY MARKERS**
602-B	**EACH**	**0**	**LAND SURVEY MARKERS**

(1) Show in field book the location by station number, side, and distance from centerline, etc. Indicate date set. Indicate in field book estimate number paid on.

(2) Submit field book, plans, sketches, etc. Show total on Summary of Quantities Sheet. Show reference on Summary of Quantities Sheet where back-up data for total can be found.

(3) Check numbers shown in field book with plan quantity. Check total on box and Summary of Quantities Sheet.

603-A	**EACH**	**0**	**FURNISHING TYPE_____FIELD OFFICE**
603-B	**L. F.**	**0**	**FURNISHING SECURITY FENCE**
603-C	**EACH**	**0**	**FURNISHING TYPE _____ FIELD OFFICE (STATE RETAINED)**
603-D	**EACH**	**0**	**STATE FURNISHED FIELD OFFICE**

(1) Show size, equipment, type, location, date delivered on project, etc. in field book. Show estimate number paid on in field book. Indicate date and percentage paid for each entry.

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION

(2) Submit field book. Show on Summary of Quantities Sheet and where backup data can be found.

(3) Check entry in field book and verify on Summary of Quantities Sheet.

605-A	**L.F.**	**1**	**PAVEMENT EDGE DRAIN**
605-B	**EACH**	**0**	**SPECIAL UNDERDRAIN OUTLET, TYPE_____.**
605-C	**L.F.**	**1**	**SPECIAL_____ INCH DIAMETER UNDERDRAIN PIPE**

(1) Record in field book the location, by station number, side, etc. Indicate date laid along with linear feet or number of the items installed. Show in book the estimate number paid on. Show totals on monthly estimate register.

(2) Submit inspector's book noted in (1) above and all pertinent information for location, quantity, etc. Show totals from inspector's book on summary of quantity sheets. Show reference on summary of quantity sheets where backup data for totals can be found.

(3) Check typical section and special detail sheet quantities against summary of quantity sheets. Verify Summary of Quantities Sheets from field book.

606-A	**L.F.**	**2**	**_____ INCH UNDERDRAIN PIPE, TYPE _*_**

**** Note specific type or types of pipe if required***

(1) Use inspector's field book for monthly estimate. Book should show location, type, size, depth of excavation, date laid, etc. Show on summary box sheet and indicate thereon and in field book estimate number paid on.

(2) Submit field book, box sheet, layout sketches, notes and sketches for any necessary ground and pipe flow line profile grades needed to show depth laid. Carry totals from box sheets to Summary of Quantities Sheet. Show reference on summary sheet where back up data for total can be found.

(3) Check sketches and field book. Check totals on different depths laid and verify totals on box and Summary of Quantities Sheets.

604-A	**S.Y.**	**1**	**SEPARATIVE GEO-TEXTILE**
607-D	**S.Y.**	**1**	**PAVING GEO-TEXTILE**
607-E	**GAL**	**1**	**ASPHALT SEALANT**
608-A	**S.Y.**	**1**	**SEPARATION GEO-TEXTILE**

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION
609-A	**S .Y.**	**1**	**AGGREGATE SLOPE PROTECTION**
609-B	**S.Y.**	**1**	**GEO-TEXTILE FILTER FOR AGGREGATE SLOPE PROTECTION**

(1) Take measurements and record in field book. Make sketches if necessary in field book and/or on cross-section sheets; show calculations with sketches. Show totals in book and/or on cross-section sheets and indicate on which estimate payment was made.

(2) Submit field book and sketches with calculations and totals. Show grand total on Summary of Quantities Sheet. Show references on Summary of Quantities Sheet as to where backup data for total can be found.

(3) The field book and sketches are checked showing where the material was placed along with all necessary calculations for computing the quantity recorded on the Summary of Quantities Sheet.

610-A	**SQ.YD.**	**1**	**LOOSE RIPRAP, CLASS _____, _____, INCH THICK,**
610-B	**SQ.YD.**	**1**	**CONCRETE SACKED RIPRAP**
610-C	**TON**	**1**	**LOOSE RIPRAP, CLASS _____**
610-D	**SQ.YD.**	**1**	**FILTER BLANKET, _*_, _*_*_**

**** If a specific type of blanket is required, so designate (Aggregate or geo-textile).***
***** If a specific kind of geo-textile blanket is required, so designate (woven or non-woven).***

(1) Place measurements for Square Yard items in field book and show sketches if needed, and calculations in field book and/or on cross-section sheets. Indicate in field book estimate number paid on. For Ton item, bind weight tickets by dates. Indicate estimate number paid on.

(2) Submit field book, tickets tabulation sheets, plans, standard drawings, special drawings, etc. Place total on Summary of Quantities Sheets. Show on Summary of Quantities Sheets where back up data for total can be found.

(3) Check special drawings, field book and tickets. Verify total on Summary of Quantities Sheets.

612-A	**C.Y.**	**2**	**(TYPE) RUBBLE MASONRY**
613-A	**C.Y.**	**2**	**BRICK MASONRY**
613-B	**C.Y.**	**2**	**CONCRETE BLOCK MASONRY**

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION

(1) Place field measurements in field book and make any necessary sketches and calculations therein and/or on cross-section sheets. Show estimate number paid on in field book and/or on cross-section sheets.

(2) Submit field book, box sheets, sketches, standard drawings, plans, etc. Carry totals from field book or box sheets to Summary of Quantities Sheets. Indicate reference on Summary of Quantities Sheet where back up data for total can be found.

(3) The field book and special drawings are checked showing where the material was used, along with all necessary calculations for computing the quantity as recorded on the Summary of Quantities Sheet.

614-A	**C.Y.**	**2**	**SLOPE PAVING**
614-B	**C.Y.**	**2**	**REINFORCED SLOPE PAVING**

(1) Daily concrete placement reports or calculations made preceding each pour and placed in a field book may be used for monthly estimate. Final estimate data shown in (2) below may also be used. Show estimate number paid on concrete reports, or in field book.

(2) Place field measurements in field book and make calculations therein and/or on cross-section sheets using any necessary sketches and plan dimensions. Submit plans, standard drawings, special drawings, etc. Show totals on box sheets and carry totals from box sheets to Summary of Quantities Sheets. Show reference on Summary of Quantities Sheets where back up data for total can be found.

(3) Check all standard dimensions against plans. Check quantities in field book and any special drawings and computations. Check total on box and Summary of Quantities Sheets.

615-A	**S.Y.**	**1**	**GROUTED RUBBLE SLOPE DRAIN**
616-A	**S.Y.**	**1**	**SOIL CEMENT FLUME**
617-A	**S.Y.**	**1**	**BITUMINOUS TREATED GLASS FIBER FLUMES**
618-A	**S.Y.**	**2**	**CONCRETE SIDEWALK _____INCHES THICK**
618-B	**S.Y.**	**2**	**CONCRETE DRIVEWAY _____INCHES THICK**

(1) Place field measurements in field book and make calculations therein and/or on cross-section sheets using any necessary sketches and plan dimensions. Show estimate number paid on in field book and/or on cross-section sheets.

(2) Submit field book, sketches, plans, standard drawings, special drawings, paving layout sheets, etc. Carry totals from box sheets to Summary of Quantities Sheets and indicate thereon where back up data for total can be found.

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION

(3) Check the calculations shown in the field book. Check the special drawings and calculations on cross-section sheets. Verify totals on Summary of Quantities Sheet.

619-A	**EACH**	**0**	**_____INCH, _*_ PIPE END TREATMENT, CLASS _____**
619-B	**EACH**	**0**	**_____ INCH SPAN, _____ INCH RISE, _*_ PIPE END TREATMENT, CLASS _____** ***_*_Specify Roadway or Sidedrain***

<u>Note!</u> Show in inspector's pipe book which pipes they are used on and record in the same method as for (1), (2) and (3) for Roadway Pipes (Item no. 530).

620-A	**C.Y.**	**2**	**MINOR STRUCTURE CONCRETE**

(1) Quantities taken from daily concrete placement reports or from calculations or plan quantities, which have been determined preceding each pour and placed in a field book, may be used for monthly estimates. Indicate on the concrete report or in the field book the estimate paid on. Final quantities as outlined in (2) below may be used for monthly estimates, if available.

(2) Submit plans, standard drawings, special drawings, box sheets, drainage sheets, etc. For structures constructed according to standard or special drawings included in the plans, where quantities are shown on these plan drawings, the plan quantity may be used for the final quantity. Quantities for other structures must be calculated using actual dimensions. Totals from plans or on special drawings should be shown on structure box sheets and on revised drainage sheets. Carry totals from box sheets to Summary of Quantities Sheets. Reference total on Summary of Quantities Sheet to back up data.

(3) On standard structures check totals using quantities off of standards. On others check special drawings for calculations. Check drainage sheet and box sheet for totals. Verity total on Summary of Quantities Sheet.

621-A	**EACH**	**0**	**JUNCTION BOXES, TYPE _____**
621-B	**EACH**	**0**	**JUNCTION BOX UNITS, TYPE _____**
621-C	**EACH**	**0**	**INLETS, TYPE_____**
621-D	**EACH**	**0**	**INLET UNITS, TYPE_____**
621-E	**EACH**	**0**	**MANHOLES, TYPE _____**
621-F	**EACH**	**0**	**MANHOLE UNITS, TYPE _____**
621-G	**EACH**	**0**	**INLET GRATES, TYPE _____**
621-I	**EACH**	**0**	**STILLING BASINS, TYPE _____**

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION
622-A	**EACH**	**0**	**MANHOLE COVERS RESET**
622-B	**EACH**	**0**	**GRATINGS RESET**

(1) Show in field book the location by Station Number, size, type, etc. and indicate when 100% complete. Indicate the estimate number paid on.

(2) Submit field book, box sheets, revised drainage sheets, plans, standard drawings, special drawings, etc. Carry totals from box sheets to Summary of Quantities Sheet where back up data for total can be found.

(3) Check number used as shown in field book and on box sheets. Verify total on Summary of Quantities Sheet.

623-A	**L.F.**	**1**	**CONCRETE GUTTER**
623-B	**L.F.**	**1**	**CONCRETE CURB, TYPE _____**
623-C	**L.F.**	**1**	**COMBINATION CURB AND GUTTER TYPE _____**
626-A	**L.F.**	**1**	**CONCRETE MEDIAN STRIP**
626-B	**C.Y.**	**2**	**CONCRETE MEDIAN STRIP**
629-A	**L.F.**	**1**	**CONCRETE MEDIAN OR SAFETY BARRIER, TYPE _____**
629-B	**C.Y.**	**2**	**CONCRETE MEDIAN OR SAFETY BARRIER, TYPE _____**
629-C	**EACH**	**0**	**CONCRETE MEDIAN OR SAFETY BARRIER END SECTION**

(1) Show in field book by location, kind, type, etc. and show field measurements as to length for linear foot items. Show length and other dimensions for cubic yard item and make calculations in field book and include any necessary sketches. Indicate estimate number paid on.

(2) Submit field book, standard drawing, special drawings, paving layout sheets, etc. Show totals on box sheets. Carry totals from box sheets to Summary of Quantities Sheets. Indicate on Summary of Quantities Sheets where back up data for total can be found.

(3) Check the calculations and lengths shown in field book and on box sheets. Verify total on Summary of Quantities Sheet.

630-A	**L.F.**	**1**	**STEEL BEAM GUARDRAIL, CLASS_____, TYPE _____**
630-B	**L.F.**	**1**	**ALUMINUM BEAM GUARDRAIL, CLASS _____**

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION
630-C	EACH	0	GUARDRAIL END ANCHOR, TYPE _____
630-D	L.F.	1	BARRIER RAIL, STEEL RECTANGULAR TUBING
630-E	L.F.	1	BARRIER RAIL, EXTRUDED ALUMINUM TUBING
631-A	EACH	0	POST RESET
631-B	EACH	0	NEW _*_ POST SET
631-C	L.F.	1	_*_*_ RAIL RESET
631-D	L.F.	1	NEW _*_*_ SET
631-E	EACH	0	GUARDRAIL END ANCHOR _*_*_*_ RESET
631-F	L. F.	1	_*_*_ RELOCATED
631-G	EACH	0	GUARDRAIL END ANCHOR _*_*_*_ RELOCATED

**** Steel, or Wood***
***** Steel Beam Guardrail Class _____, Type _____, Aluminum Beam Guardrail Class _____, Steel Rectangular Tube Barrier Rail, Extruded Aluminum Tube Barrier Rail***
****** 1, 2, 3, etc.***

(1) Show in field book by station number, kind, class, type, etc. and measure each line of rail, post, etc. in place and denote number and type of anchor with each line if applicable. Show totals on box sheets and indicate the estimate number paid on. Station to station lengths for guardrail may be used for monthly estimates if actual measured lengths are not available.

(2) Submit field book, box sheets, standard drawings, special drawings, etc. Carry totals from box sheets to Summary of Quantities Sheets and indicate on Summary of Quantities Sheets where back up data for totals can be found.

(3) Check lengths shown in field book. Check numbers shown in field book with plan quantity and check total on box and Summary of Quantities Sheet.

632-A	L.F.	1	HEADLIGHT GLARE SCREEN _*_

**** Type of Mounting***

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION
634-A	L.F.	0	INDUSTRIAL FENCE, _____ FEET HIGH
634-B	L.F.	0	INDUSTRIAL FENCE, _____ FEET HIGH PLUS BARBED WIRE, (45 DEGREE ARMS)
634-C	L.F.	0	INDUSTRIAL FENCE, _____ FEET HIGH, PLUS BARBED WIRE (VERTICAL ARMS)
634-D	EACH	0	GATE, ____ FEET WIDE, COMPLETE WITH FITTINGS (WITH BARBED WIRE) OR (WITHOUT BARBED WIRE)
634-E	L.F.	0	INDUSTRIAL FENCE_____FEET HIGH, SPECIAL MOUNTING
634-F	Lump Sum	0	PROTECTIVE CAGE (INDUSTRIAL FENCE)
635-A	L.F.	0	WOVEN WIRE FENCE
635-B	EACH	0	GATE, _____ FEET WIDE
636-A	L.F.	1	BARBED WIRE FENCE, _____ STRANDS, _____FEET HIGH
637-A	L.F.	0	FENCE RESET
637-B	L.F.	0	FENCE SET

(1) Show in field book by station number, type, kind, height, strands, etc. Measure from break point to break point, end to end or in convenient section lengths. Show number and type of gates if applicable. Show percent of Lump Sum item complete if applicable. For monthly estimates station to station lengths may be used if measured lengths are not available. Show totals on box sheets and indicate the estimate number paid on.

(2) Submit field book, box sheets, plan profile sheets, standard drawings, special drawings, etc. Carry totals from box sheets to Summary of Quantities Sheets. Show on Summary of Quantities Sheets where back up data for totals can be found.

(3) Check field book totals and verify box and Summary of Quantities Sheets.

640-A	L.F.	1	_*_ UTILITY ADJUSTMENT _*_*_
640-B	Lump Sum	0	_*_ UTILITY ADJUSTMENT _*_*_

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION
			**** Overhead or Underground*** ***** Electrical, Communication (telephone/telegraph), Gas, Water or Sewerage***

(1) For Linear Foot item measure as adjustment is completed and place in field book with description of work done. For Lump Sum item, describe work done in field book and show estimated percent complete. Keep regular utility inspector's diary sheet as to work done daily compared to work required by plans. Make and plot ground and grade profiles if necessary to indicate depth of installation. Show estimate number paid in field book.

(2) Submit field book, utility diaries, utility plan sheets, profiles, etc. Show totals on Summary of Quantities Sheets. Indicate on Summary of Quantities Sheets where back up data for total can be found.

(3) Check the lengths shown in field book. Check the totals for each item listed in the field book and check against the original plans. Verify total on box and Summary of Quantities Sheets.

641-A	**L.F.**	**2**	**_____ INCH _*_ WATER _*_*_ LAID**
641-B	**L.F.**	**2**	**_____INCH _*_ WATER_*_*_RELAID** *** Type** **** Pipe or Main**
642-A	**EACH**	**0**	**FIRE HYDRANT RESET**
643-A	**EACH**	**0**	**WATER METERS RESET**
643-B	**EACH**	**0**	**VALVE BOXES RESET**
645-A	**L.F.**	**2**	**_____ INCH _*_ SANITARY SEWER PIPE**
645-B	**L.F.**	**2**	**_____ INCH <u>CAST/DUCTILE IRON</u> SANITARY SEWER PIPE RELAID**

**** Type:***
Vitrified Clay (v.c.)
Plain Concrete (p.c.)
Reinforced Concrete (r.c.)
Cast Iron (c.i.)
Ductile Iron (d.i.)
Cast Iron Soil (c.i.s.)
ABS or PVC Composite (a.b.s.)
PVC (p.v.c.)
Concrete Lined Corrugated Metal (c. l. c. m.)

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION
649-A	**L.F.**	**0**	**_____INCH ENCASEMENT PIPE, TYPE _*_ INSTALLATION** **** Type 1, 1A, or 2***

(1) Measure pipe in place and show length, size, kind, location, and date laid, etc. in field book. Indicate also, if applicable, number, location, size, kind, etc. of Hydrants, Meters and Valve Boxes reset. Show estimate number paid.

(2) Submit field book, utility drawings, etc. Carry totals from field book to Summary of Quantities Sheet. Indicate on Summary of Quantities Sheets where back up data for total can be found.

(3) Check length and/or number used, as shown in field book. Verify total on Summary of Quantities Sheet.

650-A	**CYIP**	**1**	**TOPSOIL**

(1) Record truck measurements in field book and bind haul tickets by dates with total for date shown. Show estimate number paid on.

(2) Submit haul tickets and truck measurements. Show total on Summary of Quantities Sheets. Reference total on Summary of Quantities Sheet to back up data.

(3) Check truck bed capacity calculations, check haul tickets for date, truck number, signature, capacity, number of loads, total cubic yards, etc. verify totals on box and Summary of Quantities Sheet.

650-B	**CYIP**	**1**	**TOPSOIL FROM STOCKPILES**

(1) Cross-sections needed to compute quantity in each stockpile by average end area method are taken. As each stockpile or portion of stockpile is used, quantities are posted on cross-section sheets. Estimate number paid on is noted on cross-section sheet.

(2) Submit original and final cross-section books, cross-section sheets with quantities. Total shown on Summary of Quantities Sheets Indicate on Summary of Quantities Sheet, where back up data for total can be found.

(3) The plotting of irregularly shaped sections is checked using the original and final cross-section books. All areas are then planimetered. After all sections have been checked, volumes are computed and added to determine total topsoil used. Verify the total on summary of quantity sheet.

651-A	**ACRE**	**2**	**GROUND PREPARATION**
652-A	**ACRE**	**2**	**SEEDING MIX _*_**
652-B	**ACRE**	**2**	**TEMPORARY SEEDING MIX _*_*_**
652-C	**ACRE**	**2**	**MOWING**

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION
652-D	ACRE	2	SEEDING IN STUBBLE MIX _*_
656-A	ACRE	2	MULCHING, CLASS A, TYPE _____
658-A	ACRE	2	HYDRO SEEDING & MULCHING _*_ SEED MIX
665-A	ACRE	1	TEMPORARY SEEDING
665-B	ACRE	1	TEMPORARY MULCHING
666-A	ACRE	1	BROADCAST PEST CONTROL TREATMENT (BID LIMITED TO $30.00 PER ACRE)
668-A	ACRE	1	BROADCAST PRE-EMERGENT HERBICIDE TREATMENT
669-A	ACRE	1	BROADCAST POST EMERGENT HERBICIDE TREATMENT

**** Specify mix number***
***** Specify temporary mix Number if applicable***

(1) Acres are measured prior to beginning work and measurements placed in field book. These calculations of areas are used for pay purposes and are used to determine amounts of seed, fertilizer, hay, asphalt, etc. Records are made in field book or on inspectors report of the amounts of each material placed for each area treated, planted, etc Seed tags, invoices, delivery tickets, etc. are retained as supporting documentation for amounts used and as to quality of materials. Show in grassing book (field book) estimate number paid on.

(2) Submit book of measurements. Carry totals to Summary of Quantities Sheets. Show reference on Summary of Quantities Sheets where back up data for total can be found.

(3) Check calculations using measurements submitted. Check totals and verify on Summary of Quantities Sheets.

65l-B	Ton	2	AGRICULTURAL LIME STONE
651-C	Ton	2	_____ COMMERCIAL FERTILIZER
651-D	Ton	2	BASIC SLAG
651-E	Ton	2	SUPER PHOSPHATE
651-F	Ton	2	AMMONIUM NITRATE
651-G	Ton	2	AMMONIUM SULPHATE

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION
651-H	**Ton**	**2**	**SODIUM NITRATE**
651-I	**Ton**	**2**	**POTASSIUM CHLORIDE**

(1) Compute in field book rates of application using areas previously measured for planting. Sufficient weight and/or delivery tickets should back up computations. Soil test should be on file to justify use of extra fertilizer. Show in field book estimate number paid on.

(2) The total on the Summary of Quantities Sheet is verified using the vendor's delivery (weight) tickets and inspector's daily record book.

(3) Submit field book, weight and delivery tickets, soil test, etc. Carry totals from field book to Summary of Quantities Sheet and reference total to back up data.

653-A	**S.Y.**	**0**	**SPRIGGING**
654-A	**S.Y.**	**1**	**SOLID SODDING**
654-B	**S.Y.**	**1**	**SALVAGING AND REPLACING SOLID SOD**
659-A	**S.Y.**	**1**	**EROSION CONTROL NETTING, CLASS _____**
665-E	**S.Y.**	**1**	**POLYETHYLENE**

(1) Measurements are made of areas and measurements are placed in field book and calculations are made therein using any necessary sketches made in the field book or on cross-section sheets. Indicate in field book the estimate number paid on for each monthly total.

(2) Submit field book and sketches. Carry totals from field book to Summary of Quantities Sheets. Indicate on Summary of Quantities Sheet where back up data for total can be found.

(3) Check measurements and calculations as shown in either field book or cross-section sheets. Verify total on Summary of Quantities Sheet.

657-A	**C.Y.**	**1**	**GRASSY MULCH**
660-A	**C.Y.**	**1**	**PLANT TOPSOIL**
663-B	**C.Y.**	**1**	**TREE ROOT PROTECTION MATERIAL**
665-I	**Ton**	**1**	**TEMPORARY RIPRAP, CLASS _____**

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION

(1) Record truck bed measurements and bind haul tickets or weight tickets by dates with sheet attached showing date, where used, total for day, etc. Show on tabulation sheets the monthly estimate number paid on.

(2) Submit tickets & truck measurements. Show total on Summary of Quantities Sheets. Reference total on Summary of Quantities Sheets to back up data.

(3) Check truck bed capacity calculations, check haul tickets for date, truck number, signature, capacity, number of loads, material source, type material, cubic yards, etc. Check totals on box sheet and verify Summary of Quantities Sheets.

660-B	**EACH**	**0**	**VINES, _*_**
660-C	**EACH**	**0**	**SHRUBS, _*_**
660-D	**EACH**	**0**	**TREES, _*_**
660-E	**EACH**	**0**	**SEEDLINGS, _*_**
661-A	**EACH**	**0**	**TRANSPLANTING VINES, _*_**
661-B	**EACH**	**0**	**TRANSPLANTING SHRUBS _*_**
661-C	**EACH**	**0**	**TRANSPLANTING TREES, _*_**

*** *TYPE***

(1) Show in field book by location, kind, type, number and date planted or transplanted. Also note any dead plants replaced or deleted. Indicate in field book the estimate number paid on.

(2) Submit field book and show total on Summary of Quantities Sheets. Reference this total on Summary of Quantities Sheet to back up data.

(3) Check numbers shown in field book with plan quantity. Check total on Summary of Quantities Sheet.

663-A	**C.Y.**	**1**	**TREE WELL MASONRY**

NOTE! (1), (2), and (3) same as for item 613-A

665-C	**L.F.**	**0**	**_____INCH TEMPORARY PIPE**
665-D	**L.F.**	**0**	**TEMPORARY WIRE FENCE (INCLUDING POSTS)**
665-F	**EACH**	**0**	**HAY BALES**
665-G	**EACH**	**0**	**SAND BAGS**

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION
665-H	**EACH**	**0**	**EROSION CONTROL CHECK DAMS, TYPE**
665-J	**L.F.**	**0**	**SILT FENCE, TYPE**
665-K	**C.Y.**	**1**	**DRAINAGE SUMP EXCAVATION**

(1) In field book show Item, Location, Number used for per each items, actual measured length for linear foot items and dimensions and calculations for cubic yard item. Show date installed. Show in field book estimate number paid on.

(2) Submit field book. Carry totals from field book to Summary of Quantities Sheet. Show reference on Summary of Quantities Sheet where back up data for total can be found.

(3) Check field book for lengths and number of items. Check totals and verify on Summary of Quantities Sheet.

666-B	**GAL**	**0**	**SPOT PEST CONTROL TREATMENT**
668-B	**GAL**	**0**	**SPOT PRE-EMERGENT HERBICIDE TREATMENT**
669-B	**GAL**	**0**	**SPOT POST EMERGENT HERBICIDE TREATMENT**

(1) Show in field book where placed. Indicate gallons used. Show total gallons for month and indicate estimate number paid on.

(2) Submit field book and show grand total from same on Summary of Quantities Sheet. Show reference on Summary of Quantities Sheet as to where back-up data can be found.

(3) The field book and sketches are checked showing where the material was placed along with all necessary calculations for computing the quantity recorded on the Summary of Quantities Sheet.

666-C	**S.Y.**	**1**	**SPOT PEST CONTROL TREATMENT**
668-C	**S.Y.**	**1**	**SPOT PRE-EMERGENT HERBICIDE TREATMENT**
669-C	**S.Y.**	**1**	**SPOT POST EMERGENT HERBICIDE TREATMENT**

(1) Take measurements and record in field book. Make sketches in field book and/or on cross-section sheets if needed, show calculations with sketches. Show totals in book and/or on cross-section sheets and indicate on which estimate payment was included.

(2) Submit field books and sketches with calculations and totals. Show grand total on Summary of Quantities Sheet. Show reference on Summary of Quantities as to where back-up data for total can be found.

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION

(3) The field book and sketches are checked showing where the material was placed along with all necessary calculations for computing the quantity recorded on the Summary of Quantities Sheet.

680-A	**LUMP SUM**	**0**	**ENGINEERING CONTROLS**

(1) Use percentage of project completion to compute amount due. Show calculations and amount paid in field book.

(2) Show on Summary of Quantities Sheet as 100% complete when project is complete.

(3) Check final monthly estimate to verify Summary of Quantities Sheet.

701-A	**MILE**	**3**	**SOLID OR BROKEN COLOR, CLASS _*_ TYPE _*_*_ TRAFFIC STRIPE _*_*_*_**
701-B	**L.F.**	**0**	**DOTTED CLASS _*_ TYPE _*_*_ TRAFFIC STRIPE _*_*_*_**
701-C	**MILE**	**3**	**SOLID OR BROKEN TEMPORARY TRAFFIC STRIPE _*_*_*_*_**
701-D	**MILE**	**3**	**SOLID OR BROKEN TRAFFIC STRIPE REMOVED _*_*_*_*_**
701-E	**L.F.**	**0**	**SOLID OR BROKEN TEMPORARY TRAFFIC STRIPE _*_*_*_*_**
701-F	**L.F.**	**0**	**DOTTED TEMPORARY TRAFFIC STRIPE _*_*_*_*_**
701-G	**L.F.**	**0**	**SOLID OR BROKEN COLOR, CLASS _*_ TYPE _*_*_ TRAFFIC STRIPE _*_*_*_**
701-H	**L.F.**	**0**	**SOLID/BROKEN/DOTTED TRAFFIC STRIPE REMOVED _*_*_*_*_**

*** Specify "1", "2", "2T", "3", or "3W".**
**** Specify "A" or "B"**
***** If Class 2 Stripe, specify thickness in inches.**
****** Specify "Paint", "Plastic", "Tape", etc., only if required.**

702-A	**MILE**	**3**	**SOLID/BROKEN COLOR, INVERTED PROFILE TRAFFIC STRIPE _*_**

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION
702-B	L.F.	0	DOTTED INVERTED PROFILE TRAFFIC STRIPE _*_ * Specify "4" Wide or "6" Wide.
703-A	S.F.	1	TRAFFIC CONTROL MARKINGS, CLASS _____, TYPE _____
703-B	S.F.	1	TRAFFIC CONTROL LEGENDS, CLASS _____, TYPE _____
703-C	S.F.	1	REMOVAL OF TRAFFIC CONTROL MARKINGS OR LEGENDS
703-D	S.F.	1	TEMPORARY TRAFFIC CONTROL MARKINGS
703-E	S.F.	1	TEMPORARY TRAFFIC CONTROL LEGENDS
703-F	S.F.	1	COLD LAID POLYMERIC TRAFFIC CONTROL MARKINGS
703-G	S.F.	1	COLD LAID POLYMERIC TRAFFIC CONTROL LEGENDS
705-A	EACH	0	PAVEMENT MARKERS, CLASS _____ TYPE _____
707-A	EACH	0	TYPE_____, COLOR DELINEATOR INSTALLATION
707-B	EACH	0	TYPE _____, HAZARD MARKER INSTALLATION
708-A	S.F.	0	TYPE _____ OBJECT SAFETY MARKING
709-A	EACH	0	MILEPOST, TYPE _____
709-B	EACH	0	MILEPOST, RESET _____

(1) Show in field book Item, Location, date placed, measurements of lengths, square feet measurements or number placed depending upon item being used. Make any necessary calculations in field book using measurements and necessary plan dimensions. Indicate in field book the estimate number paid on. For monthly estimates where field measurements have not been made, quantities may be estimated using plan dimensions, station to station lengths, etc.

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION
710-A	**S.F.**	**2**	**CLASS _*_, _*_*_ SIGN PANELS _*_*_*_**
710-B	**L.F.**	**1**	**ROADWAY SIGN POST (DESCRIPTION & SIZE)**
710-C	**LUMP SUM**	**0**	**REMOVAL OF EXISTING ROADWAY SIGNS**
			*** Appropriate Class** **** Aluminum Flat** **Steel Flat** **Aluminum Multiple Flat** **Steel Multiple Flat** **Aluminum Laminated** **Aluminum Louvered** ***** Approximate thickness of panel material desired**
711-A	**LUMP SUM**	**0**	**ROADWAY SIGN RELOCATION**
711-B	**LUMP SUM**	**0**	**ROADWAY SIGN RENOVATION**
713-A	**L.F.**	**1**	**PERMANENT BARRICADES**
715-A	**LUMP SUM**	**0**	**OVERHEAD ROADWAY SIGN STRUCTURE**
717-A	**LUMP SUM**	**0**	**OVERHEAD ROADWAY SIGN STRUCTURE NO. _____ RENOVATION**
717-B	**LUMP SUM**	**0**	**OVERHEAD ROADWAY SIGN STRUCTURE NO._____ RELOCATION**

(1) Sketches of signs should be made on cross-section sheets, where necessary, showing all dimensions in order to determine post lengths. Calculations for square feet and post lengths, for pay, should be made on these sheets or in a field book. The date the sign and/or post is complete in place and the estimate number paid on should also be shown. For Lump Sum items, a description of the work done each month and the percent complete, estimate paid on, etc., should be shown in a field book. Permanent barricades should be placed in field book with measurements and date placed.

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION
720-A	**EACH**	**0**	**VEHICULAR IMPACT ATTENUATOR ASSEMBLY _*_** **** Description and Model of Attenuator Assembly***
726-A	**L.F.**	**1**	**PORTABLE CONCRETE SAFETY BARRIERS, TYPE _*_**
726-B	**L.F.**	**1**	**PORTABLE CONCRETE SAFETY BARRIERS, TYPE _*_**
726-C	**L.F.**	**1**	**STATE FURNISHED PORTABLE CONCRETE SAFETY BARRIERS**
726-D	**EACH**	**0**	**PORTABLE IMPACT ATTENUATOR _*_*_**
726-E	**EACH**	**0**	**STATE FURNISHED PORTABLE IMPACT ATTENUATOR** ****Show specific type, if required***

(1) Show in field book the location by Station Number, number of units or length, type, etc. and indicate when placed. Indicate estimate number paid on.

(2) Submit field book, plans, standard drawings, special drawings, etc. Show total on Summary of Quantities Sheet where back up data for total can be found.

(3) Check number or lengths used as shown in field book. Verify total on Summary of Quantities Sheet.

728-A	**EACH**	**0**	**TRUCK MOUNTED IMPACT ATTENUATOR UNIT** ***Note! Same as 1, 2, and 3 for item no. 410-C***
730-A	**LUMP SUM**	**0**	**REMOVAL OF EXISTING TRAFFIC CONTROL UNIT**

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION
730-B	LUMP SUM	0	REMOVAL OF EXISTING TRAFFIC CONTROL SYSTEM
730-C	LUMP SUM	0	FURNISHING AND INSTALLING TRAFFIC CONTROL UNIT
730-D	LUMP SUM	0	FURNISHING AND INSTALLING TRAFFIC CONTROL SYSTEM

(1) Give a description of the work completed each month in a field book and estimate the percent complete. Maintain a file on all material submittals and approvals including dates submitted, approved, delivered, installed, etc., and indicate in field book if equipment delivered is same as equipment approved.

(2) Submit field book, plans, standard drawings, special drawings, and file on materials. Show on summary of quantity sheets as 100% complete. Show reference as to where back up data can be found.

(3) Check field book for date of completion of work Compare items against plan quantity.

740-A	LUMP SUM	0	TRAFFIC CONTROL SCHEME
740-B	S.F.	1	CONSTRUCTION SIGNS
740-C	S.F.	1	SPECIAL CONSTRUCTION SIGNS
740-D	EACH	0	CHANNELIZING DRUMS
740-E	EACH	0	CONES (36" HIGH)
740-F	EACH	0	BARRICADES, TYPE _____
740-G	EACH	0	BARRICADES, TYPE 1, (PORTABLE 24" WIDE)
740-H	EACH	0	DELINEATORS
740-I	EACH	0	WARNING LIGHTS, TYPE _____
740-J	EACH	0	ELECTRIC INCANDESCENT OR FLUORESCENT LIGHT
740-K	EACH	0	AREA LIGHT
740-L	EACH	0	VERTICAL PANEL _*_
740-M	EACH	0	BALLAST FOR CONE
740-O	EACH	0	PILOT CAR

**** Specify either single-sided or double sided***

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION

(1) List each unit or installation in field book. Indicate location by station, description, date placed and date removed. Put necessary measurements and/or calculations in field book. Show estimate paid on in field book.

(2) Submit field book containing information and calculations contained in (1) above. Show grand total on Summary of Quantities Sheet. Show references on Summary of Quantities Sheet as to where backup data for total can be found.

(3) Check quantities shown on Summary of Quantities Sheet against totals in field book. Check calculations in field book.

741-A	**EACH**	**0**	**STATE RETAINED PORTABLE SEQUENTIAL ARROW AND CHEVRON SIGN UNIT**
741-B	**EACH**	**0**	**STATE FURNISHED PORTABLE SEQUENTIAL ARROW AND CHEVRON SIGN UNIT**
741-C	**EACH**	**0**	**PORTABLE SEQUENTIAL ARROW AND CHEVRON SIGN UNIT**

(1) Show in field book the location by station number, Description, make, model, serial no. and the date placed and removed. Show estimate paid on in field book.

(2) Submit field book. On Summary of Quantities Sheet show grand total and references where backup data for total can be found.

(3) Check number used as shown in field book. Verify total on Summary of Quantities Sheet.

745-A	**HOUR**	**0**	**UNIFORMED POLICE OFFICER**

(1) Show locations worked, number, names, dates and hours worked in field book. Show totals in field book and indicate estimate number paid on.

(2) Submit field book. Show total on Summary of Quantities Sheet and where backup data can be found.

(3) Check entry in field book and verify on Summary of Quantities Sheet.

756-A	**L.F.**	**0**	**_____ INCH ELECTRICAL CONDUIT, _*_ LINES, TYPE _*_*_ INSTALLATION**

**** Specify number of lines in installation***
***** Specify type of installation***

ITEM NO.	UNIT	NO. DECIMALS	DESCRIPTION

(1) Measure duct in place and show length, type, size, location, and date installed, etc. in field book. Show estimate number paid on.

(2) Submit field book, drawings, etc. Carry totals from field book to Summary of Quantities Sheet. Indicate on Summary of Quantities Sheet where backup data for total can be found.

(3) Check lengths as shown in field book. Verify total on Summary of Quantities Sheet.

999	**PER HOUR**	**1**	**TRAINEE HOURS**

(1) Trainees to be paid only once unless specifically asked for and approval given by EEO Coordinator. Trainees shall be paid for only when they have completed training. (Either terminated or graduated.) Trainees shall be paid according to monthly training report. Monthly training report should match certified payroll transcript.

(2) Submit copy of last training report (either terminated or graduated) for each trainee. Show total hours on summary of quantity sheets. Indicate on Summary of Quantities Sheet where back up data for total can be found.

(3) Check with EEO Coordinator to determine if hours on training reports and on summary of quantities sheet agree with total from his/her records.

1:3:B:1.11 GUIDANCE PLATES

Examples of a number of work sheets, forms and other items are provided herein as a guide.

PLATE INDEX

PLATE

A……..Summary of Quantities
B……..Calculation of Irregular Areas
C……..Trenching and Bedding Pipe
D……..Excavation and Backfill of Drainage Structures
E……..Calculation of Structure Excavation for Pipes
F……..Excavation for Pipes in a fill Section
G……..Excavation for Pipes in a Cut Section
H……..Test Report Register
I……Imperfect Trench Method
J……..Information on Structure Excavation
K……..Calculation of Pavement Areas
L……..Calculation of Pavement Areas
M……..Calculation of Pavement Areas
N……..….Computing Slope Paving Area & Sprigging and Seeding Notes
O……..….Sample Graph for Rate of Placement for Bituminous Pavement
P……..Vacant
Q……..Sample of Refer. Monthly Est. Backup Data
R……..…Original Cross–sections
S……..……Alignment Notes
T……..Pit Base Line Stake Out
U……..Profile Leveling
V……..Daily Utility Relocation Report
W……Inspector's Daily Report
X……..…BMT-38 Summary of Tests
Y……..…BMT-38 Summary of Tests (Continuation)
Z……..Form C-30 Monthly Estimate Documentation
AA……...Calculating Shoulder/Slope Widths

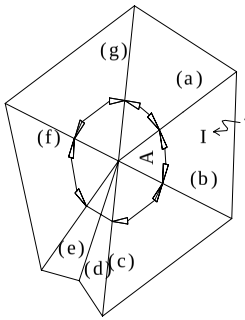
SUMMARY OF QUANTITIES

PROJECT NO._____

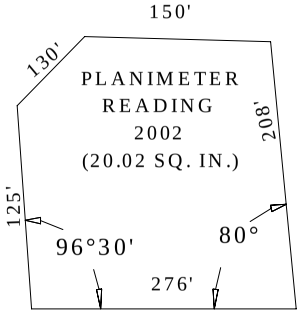
_____COUNTY

PLAN QUANTITY	FIELD QUANTITY	UNIT	ITEM NO.	DESCRIPTION
39	39	LUMP SUM	201A-000	CLEARING AND GRUBBING (APPROX.40 acres)
3	3	LUMP SUM	205A-000	REMOVAL OF STRUCTURES (See detail sheet no. 9)
48560	49201	CU. YD. IN PL.	210A-000	UNCLASSIFIED EXCAVATION (Sheet no. 42-175)
225	228	CU. YD.	214A-000	STRUCTURE EXCAVATION (Sheet no. 18-26)
642	648.2	TON	231B-000	ROADBED STABILIZING MATERIAL (AHD NO.410) (Sheet no. 32 & Tickets 1-22)
750	746.32	TON	429A -241	IMPROVED BITUMINOUS CONCRETE BASE LAYER, 1½" MAXIMUM AGGREGATE SIZE MIX, ESAL RANGE C (Sheet no. 41 & Tickets 12-89)
62	68.811	CU. YD.	524A-010	CULVERT CONCRETE (Sheet no. 27 & Std. Dwg. W 5-2:1-0º)
64	64.36	LIN. FT.	530A-002	24" CLASS 3 R. C. PIPE, (Sheet 6-A)
82	82.47	LIN. FT.	530A-004	36" CLASS 3 R. C. PIPE, (Sheet no. 6-A)
47	47	EA.CH	602A-000	RIGHT OF WAY MARKERS (Book 6, Page 22)
6	5.256	Acre	652B-000	SEEDING (MIX A) (MAXIMUM BID LIMITED TO $375.00 PER ACRE)(Book 7, Page 16-36)
12000	11860	SQ. YD.	653A-000	SPRIGGING (Book 7, Page 37-57)
800	0	SQ. YD.	654A-001	SOLID SODDING (BERMUDA) (Deleted from Contract)

SUGGESTED METHODS OF CALCULATION FOR CLEARING AND GRUBBING OF IRREGULAR AREAS



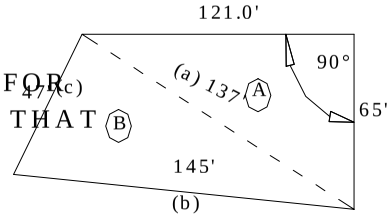
$\Delta = \frac{1}{2}\ a\ b \sin A$



PLANIMETERED
SCALE: 1" = 50' (1 SQ. IN. = 2500

$\frac{20.02 \text{ SQ. IN.} \times 2500}{43{,}560} = 1.149$ ACRES

OBTAIN AREA OTHER IN A SIMILAR MANNER TO THAT FOR Δ A
NOTE: SET INSTRUMENT SO THAT ALL CORNERS ARE VISIBLE.



(A) = ½ BASE × HEIGHT =
32.5 × 121.0 = 3933 SQ. FT.

(B) S = ½ (a + b + c) =
S = ½ (137 + 145 + 47) =
$S = \frac{329}{2} = 164.5$

AREA = [S (S - a) (S - b) (S - c)] ^ ½
= [164.5 (164.5 - 137) (164.5 - 145) (164.5 - 47)] ^ ½
= [164.5 × 27.5 × 19.5 × 117.5] ^ ½
= [10,365,143] ^ ½
$\frac{7153 \text{ SQ. FT.}}{43560} = 0.164$ ACRES

A. RULES FOR TRENCHING AND BEDDING OF PIPES (CLASS "C" BEDDING)

1. All pipes 48 inches in diameter or less are to be laid in trench, using class "C" bedding if fill above the top of pipe is 47 feet or less. If the fill above the top of pipe exceeds 47 feet the Imperfect Trench Method (Class "C-1" Bedding) is to be used.

2. Where bottom of pipe, above 48 inches in diameter, is above natural ground, the trench (Class "C" Bedding) and the Imperfect Trench (Class "C-1" Bedding) is not required.

3. Where bottom of pipe, above 48 inches in diameter is below natural ground and the fill above the pipe exceeds 34 feet, the Imperfect Trench Method (Class C-1 Bedding) is to be used.

B. GENERAL INFORMATION (FOUNDATION BACKFILL)

1. Additional structure excavation (Undercut) to provide for placing foundation backfill, will be measured in cubic yards by the cross section and average end area or other accepted feasible methods.

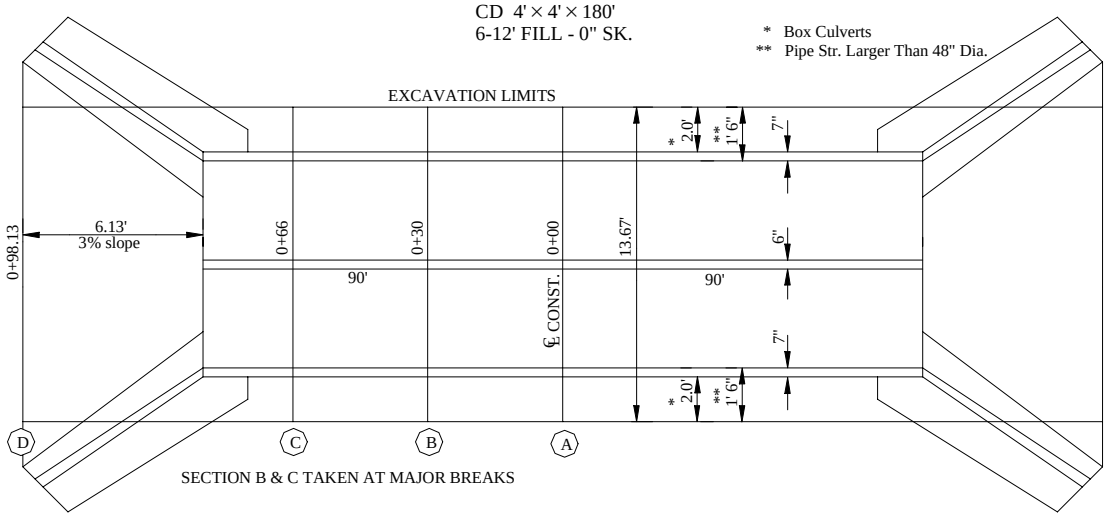
2. Foundation backfill will not be measured directly but the volume will be fixed at 150% of the volume of the excavation which it replaces.

3. Where satisfactory structure foundation is provided by the normal process of removing and backfilling unsuitable material under fill areas, during normal grading operations, none of such backfill removed and used when laying pipe, will be classified as foundation backfill.

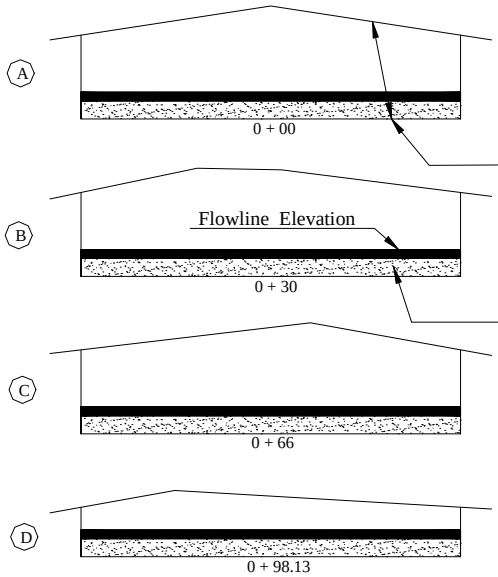
4. Foundation backfill may be defined as material taken from selected grading operations or areas beyond the right-of-way.

STRUCTURE EXCAVATION AND BACKFILL FOR
DRAINAGE STRUCTURES & MINOR STRUCTURES
PROJECT NO. _____
STA. 478 + 15
CD 4' × 4' × 180'
6-12' FILL - 0" SK.

* Box Culverts
** Pipe Str. Larger Than 48" Dia.



THIS EXAMPLE FOR LEFT SIDE ONLY



SEE MINOR STRUCTURE, BOOK 1, PAGE ____

STD. DWG. NO. CD - 44
STD. DWG. NO. W4 - 31 - 0

Total Structure Excavation Shall Be Measured By Cross Section Or Other Approved Method, Including All Undercut.

Foundation Backfill Shall Be Measured By The Actual Volume In Place Plus 50%.

NOTE:
THIS SHEET SHALL BE USED FOR BOX CULVERTS AND PIPE LARGER THAN 48" IN DIAMETER.

AREA		VOL.	
Str. Exc.	Found. B'fill	Str. Exc.	Found. B'fill
185	60		
		211	67
196	60		
		270	80
210	60		
		196	71
120	60		
TOTALS		677	218
			109*
			327

* +50%

REFER TO ARTICLE 214.04 FOR METHOD OF MEASUREMENT

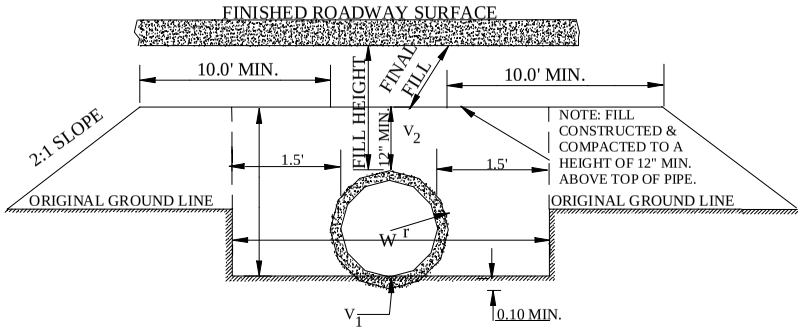
METHOD OF MEASUREMENT OF STRUCTURE EXCAVATION FOR CONCRETE & METAL PIPE USING CLASS C BEDDING

ARTICLE 214.04 FOR METHOD OF MEASUREMENT
REFER TO: ARTICLE 530.03 FOR CONSTRUCTION REQUIREMENTS
SPECIAL DRAWING NO. RCP - 530

CONCRETE PIPE (ROUND)								
PIPE SIZE	T	D	ID	h	W	V_1	V_2	V *
15"	2.25	19.5	1.95	29.55	51	0.003912	0.387616	0.391528
18"	2.50	23.0	2.30	32.70	54	0.005442	0.454167	0.459609
21"	2.75	26.5	2.65	35.85	57	0.007225	0.525579	0.532604
24"	3.00	30.0	3.00	39.00	60	0.009259	0.601852	0.611111
30"	3.50	37.0	3.70	45.30	66	0.014084	0.768981	0.783068
36"	4.00	44.0	4.40	51.60	72	0.019918	0.955386	0.975474
42"	4.50	51.0	5.10	57.90	78	0.026759	1.161574	1.188333
48"	5.00	58.0	5.80	64.20	84	0.034609	1.387037	1.421646

$V^* = V_1 + V_2$ (USE ONLY WHEN FILL IS 12" ABOVE TOP OF PIPE)

Units for V, V_1, V_2 are C.Y./L.F.



$$V_1 = \frac{0.16^* \times r \times 12''}{46656} = \text{CU. YD. / FT.}$$

$$V_2 = \frac{h \times w \times 12''}{46656} = \text{CU. YD. / FT.}$$

h = D MINUS 0.10 + 12"

w = PIPE INSIDE DIA. + 36"

T = PIPE THICKNESS IN INCHES

V = VOLUME IN CUBIC YARDS

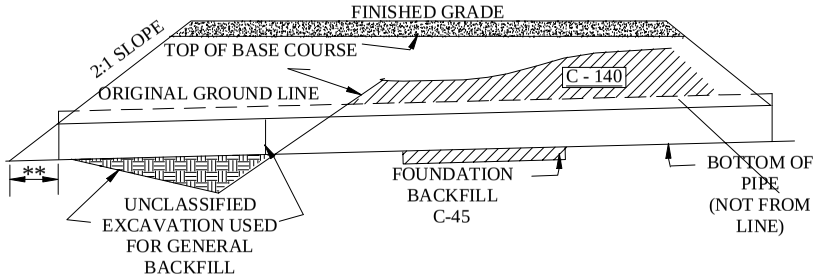
D = OUTSIDE VERTICAL DIA. OF PIPE IN INCHES

*THIS IS A CONSTANT CALCULATED FROM VARIOUS FORMULAS THAT CAN BE USED ON ALL PIPE SIZES.

r = outside radius of pipe in in.

METAL PIPE (ROUND)						
PIPE SIZE	ID	h	W	V_1	V_2	V
15"	1.5	25.5	51	0.0023148	0.3344907	0.3368055
18"	1.8	28.2	54	0.0033333	0.3916667	0.3950000
21"	2.1	30.9	57	0.0045370	0.4530093	0.4575463
24"	2.4	33.6	60	0.0059259	0.5185185	0.5244444
30"	3.0	39.0	66	0.0092593	0.6620370	0.6713963
36"	3.6	44.4	72	0.0133333	0.8222222	0.8355555
42"	4.2	49.8	76	0.0181481	0.9990741	1.0172222
48"	4.8	55.2	84	0.0237037	1.1925926	1.2162963

SECTION WHERE FILL HEIGHT IS MORE THAN 12" ABOVE TOP OF PIPE



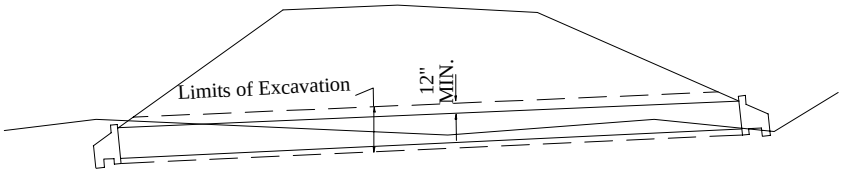
EXAMPLE

73' - 36" PIPE

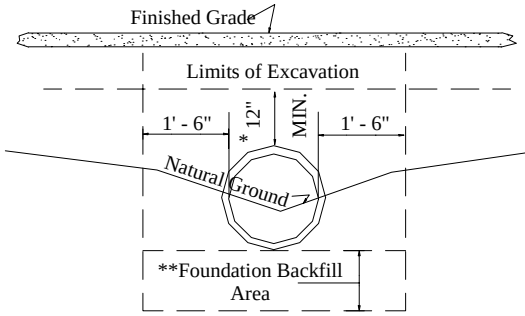
	$\frac{140 \times 6}{27}$	=	31.1
(LENGTH = 73 + 5 + 1 = 79)	79 x 0.975474	=	77.1
EXCAVATION FOR FOUNDATION BACKFILL	$\frac{45 \times 6}{27}$	=	10.0
	118.2 CU. YD. STRUCTURE EXCAVATION		

** SEE SPECIAL DRAWING NO. HW - 614 - B

CLASS "C" BEDDING
EXAMPLE OF EXCAVATION FOR PIPES LAID IN FILL SECTION
30' FROM TOP OF PIPE OR LESS



*Excavation Above Subgrade Will be Paid For As Unclassified Excavation.
Excavation Below Subgrade Will Be Paid For As Structure Excavation, Except Payment Will Not Be Made in Excavating A Fill Section Placed in Excess of 12" Over Top of Pipe.

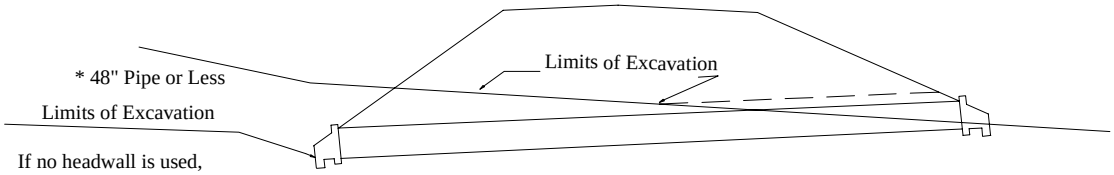


TYPICAL SECTION

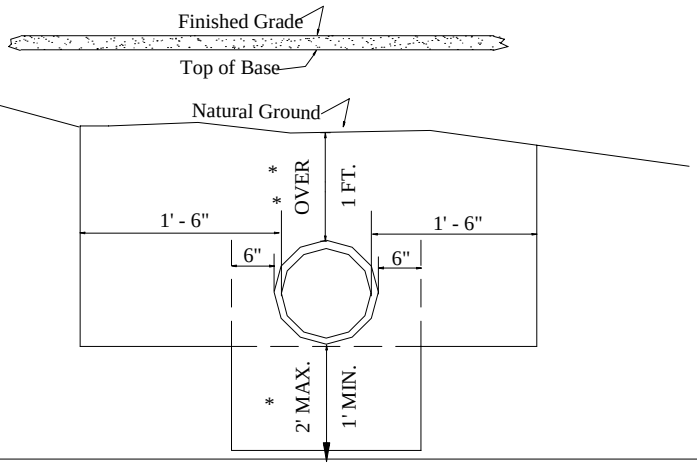
Note:
For pipes only where the original ground line is above the elevation of the bottom of the pipe.

All Pipes 48" in Dia. Or Less Shall Be Trenched.
**Foundation Backfill Will Not Be Measured Directly, But The Volume of The Backfill Will Be Fixed At 150% of The Volume Of The Excavation Which it Replaces.

CLASS "C" BEDDING
EXAMPLE FOR PIPES LAID IN CUT SECTION & WHERE ROCK
OR HARD UNYIELDING FOUNDATION EXIST



If no headwall is used, 1' outside end of pipe.
If headwall is used, no allowance shall be made for flare of wings.



** Excavation to natural ground line shall be paid for as Structure Excavation.

* This shall be a min. of 12" undercut or 1/2" per ft. of fill over top of pipe which ever is greater but not to exceed 2'.

STATE OF ALABAMA
DEPARTMENT OF TRANSPORTATION

TEST REPORT REGISTER

PROJECT NO._____

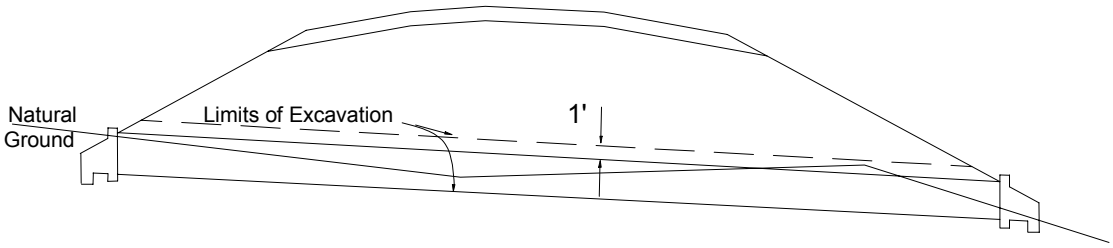
TYPE MATERIAL _____

PLAN QUANTITY

FINAL QUANTITY_____

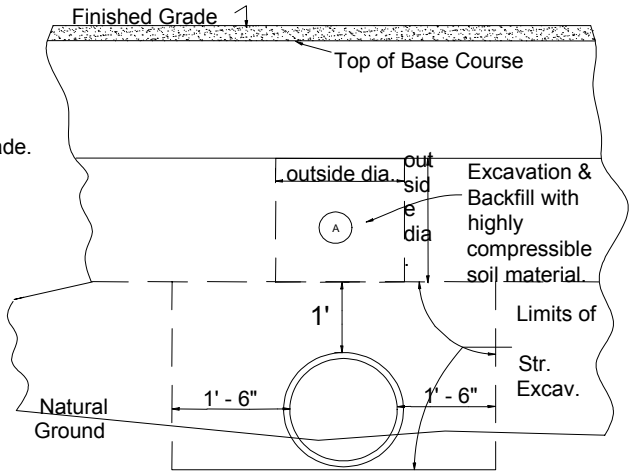
DATE DELIVERED	QUANTITY DELIVERED	QUANTITY TESTED	DATE TESTED	LAB. NO.	DELIVERED TO DATE	PAID TO DATE	REMARKS
1-20-01	100 Ton	100 Ton	1-10-01	11-3-ST	100 Ton	91.3	
1-22-01	100 Ton	100 Ton	1-12-01	11-3-ST	200 Ton		

CLASS "C-1" BEDDING (IMPERFECT TRENCH)
EXAMPLE OF PIPE LAID WHEN CLASS "C-1" BEDDING IS SPECIFIED ON PLANS



(A) No separate measurement or payment of the excavation and backfill yardage involved in the excavation of the Imperfect Trench Method will be made.

When so specified on the plans, Class C - 1 Bedding or Imperfect Trench Method may be used.



TYPICAL SECTION

GENERAL INFORMATION ON THE ITEM OF
STRUCTURE EXCAVATION

A- WIDTH OF EXCAVATION

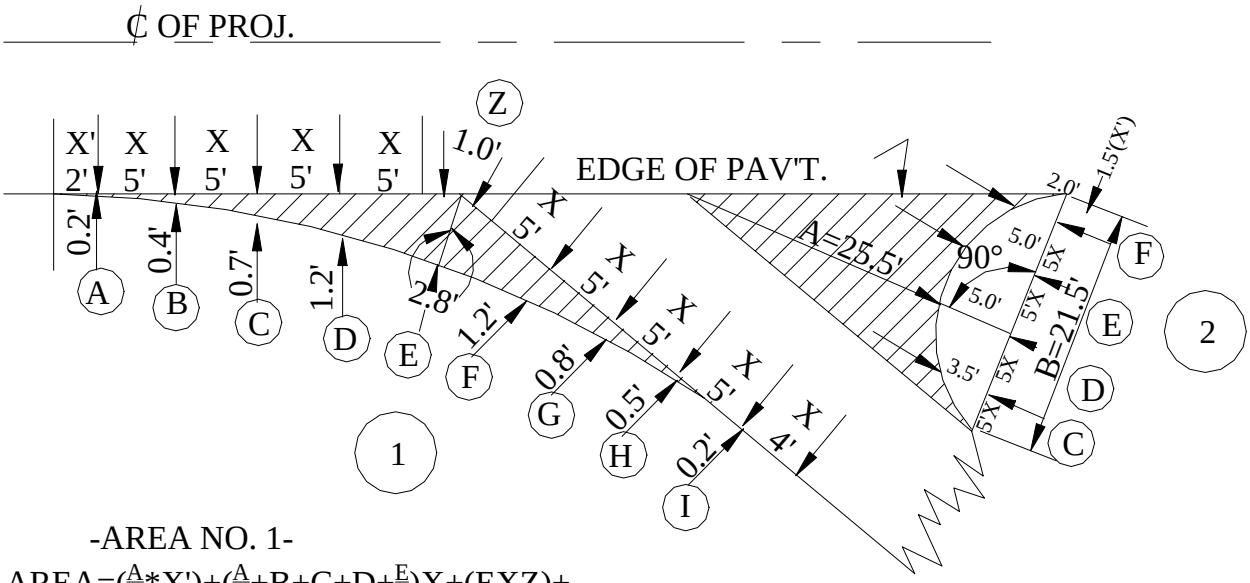
1. The width of the excavation shall, in the case of all pipe structures, be considered the inside diameter of the pipe plus three (3) feet.

2. For box culverts, the width shall be the outside width of the barrels plus four (4) feet. On all culvert structures, no allowance will be made for wing flares or toe walls.

B- LENGTH OF EXCAVATION

1. The length of the excavation for box, arch and pipe culverts shall be the actual length of the structure (including inlets, Junction boxes, etc.) measured along the flowline plus one (1) foot at each end. When head walls or wing walls are used, the length shall be the average net length of structure, tip to tip of wings.

X = CONSTANT INTERVALS
X' & X" = IRREGULAR INTERVALS



-AREA NO. 1-

AREA=$(\frac{A}{2}*X')+(\frac{A}{2}+B+C+D+\frac{E}{2})X+(EXZ)+$
$(\frac{E}{2}+F+G+H+\frac{I}{2})X+(\frac{I}{2}*X'')$

AREA=$(\frac{0.2}{2}*2)+(0.2+0.4+0.7+1.2+\frac{2.8}{2})5+$
$(2.8*1.0)+(\frac{2.8}{2}+1.2+0.8+0.5+\frac{0.2}{2})5+(\frac{0.2}{2}*4)=$

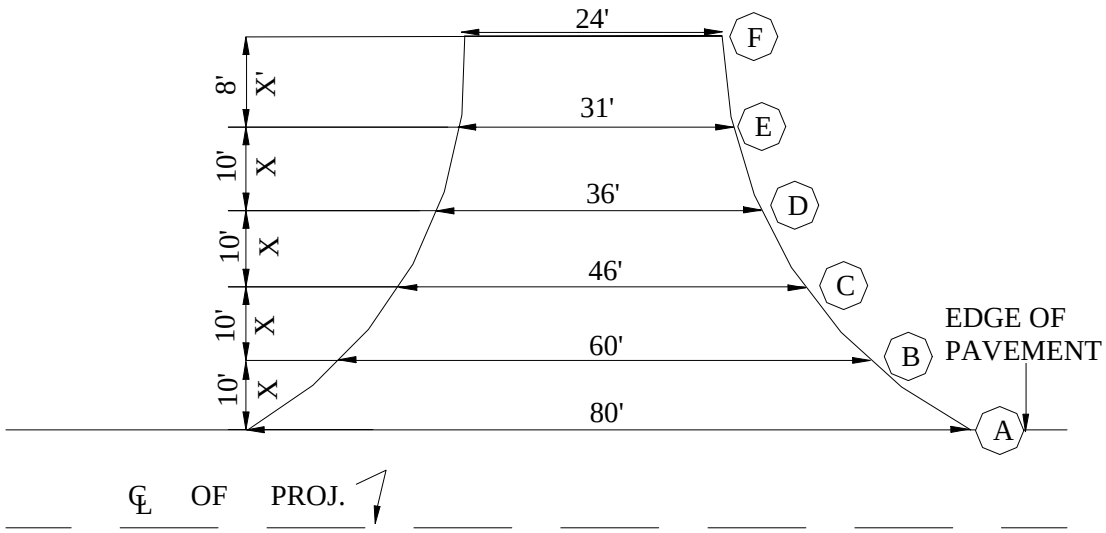
AREA=0.2+19+2.8+20+0.4=42.4 SQ.FT.

-AREA NO.2-

AREA=$(\frac{1}{2}ALT.*BASE)-[(\frac{ZERO}{2}+C+D+E+\frac{F}{2})X+(\frac{F}{2}*X')])$

AREA=$(\frac{25.5}{2}*21.5)-[(3.5+5.0+5.0+\frac{2.0}{2})5+(\frac{2.0}{2}*1.5)]$

AREA=274.13-74.0=200.13 SQ.FT.



X = CONSTANT INTERVALS
X' = IRREGULAR INTERVALS

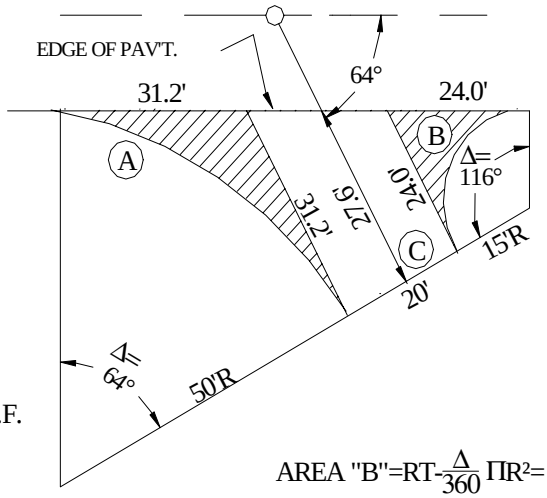
$$\text{AREA} = \left(\tfrac{A}{2}+B+C+D+\tfrac{E}{2}\right)X+(E+F*X')=$$
$$\left(\tfrac{80}{2}+60+46+36+\tfrac{31}{2}\right)10+\left(\tfrac{31+24}{2}*8\right)=$$
$$(40+60+46+36+15.5)10+(27.5*8)=$$
$$1975+220 = 2195 \text{ SQ. FT.}$$

ALL LONGITUDINAL DISTANCES USED FOR FINAL CALCULATIONS OF PAVEMENTS ARE TO BE FLAT CHAINED OR MEASURED BY APPROVED METHODS OR EQUIPMENT.

AREA OF EACH TURNOUT, INTERSECTION, WIDENING OR TRANSITION SHOULD BE SHOWN DERIVED FROM FIELD MEASUREMENTS, USING SKETCHES WHERE NECESSARY. (OR PLANIMETER MAY BE USED ON SCALE DRAWINGS). SKETCHES AND CALCULATIONS MAY REMAIN IN FIELD BOOK AND NOT DRAWN AGAIN ON SEPARATE SHEETS. (HAVE FIELD BOOK REFERENCED TO PLAN ASSEMBLY.)

IT WILL SAVE WORK USUALLY IF THESE AREAS ARE LEFT IN SQUARE FEET AND TOTAL SQAURE FEET OBTAINED BEFORE CONVERTING TO SQUARE YARDS.

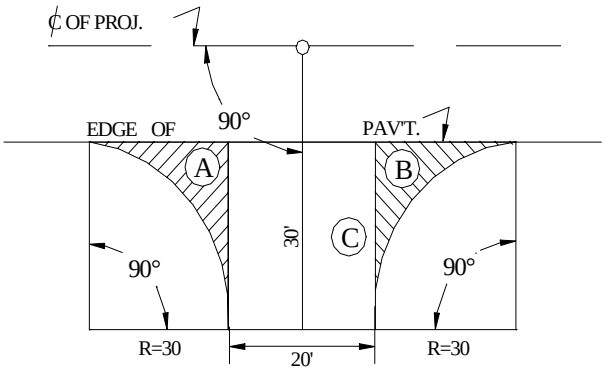
NOTE: USE THIS IF CURVE DATA AVAILABLE



AREA "C"
27.6X20=552 S.F.

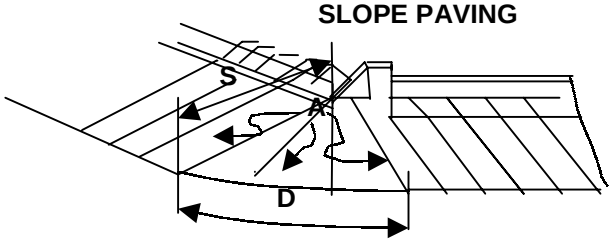
AREA "B"=RT-$\frac{\Delta}{360}$ ΠR²=
(15' X 24)-($\frac{116}{360}$ X 3.1416 X 15²)=
360-227.8=132.2 S.F.
TOTAL FOR INTERSECTION
552+164+132.2=848.2 S.F.

AREA "A"=RT-$\frac{\Delta}{360}$ΠR²=
(50 X 31.2)-($\frac{64}{360}$ X 3.1416 X 50²)=
1560-1396=164 S.F.



AREA "A"=AREA "B"=.2146R²
AREA "A"+"B"+"C"=2(.2146)R²+AREA "C"
2(.2146)(900)+(20 X 30)=
386.28+600=986.28 S.F.

SLOPE PAVING



METHOD OF COMPUTING CONICAL AREA OF PORTION "A"

S= slant height
D=Measured arc distance at base of conical portion

$\frac{D}{2} \times S$ = AREA SECTION "A"

SUGGESTED METHOD FOR PREPARING SPRIGGING & SEEDING BOOKS

LEFT						RIGHT				
STA	WIDTH		S.F.	REM.		STA	Width		S.F.	REM.
+50	12		500*			500	16			End T.O.
499	11		576			+50	15		775	
499 + 38b 499 + 47a			488	EQUA.		501	17		800	
+50	14					+50	20		925	
500	12		650			501+78	22		588	Begin Br.
+50	8		500			503+24	14			End Br.
+75	9		213			+50	14		364	
501	11		250			504	13		675	
+50	13b–8a		600			+50	11		600	
501 + 78	7		210	Begin Br.		505	13		600	
503+ 24	8			End Br.		+25	13		325	Begin T.O.
+50	9		221			+46	12			End T.O.
+75	9		225			+50	11		58	
504	8		213			506	11		550	
+50	7		375			+50	11		550	
505	6		325			507	13		600	
+25	6		150	Begin T.O.		+25	12		312	
+58	7			End T.O.		+50	14		325	
506	4		231			508	16b-5a		750	
+50	5		225			+50	4		225	
	PAGE	TOTAL	5951	**			PAGE	TOTAL	9022	**

* NOTE: AREA BETWEEN STATION 498+00 AND STATION 498 + 50. (WIDTH SHOWN ON PREVIOUS PAGE)

** NOTE: IT IS SUGGESTED THAT EACH PAGE BE TOTALED AS SHOWN WITH GRAND TOTAL SHOWN ON LAST PAGE OR WHERE NECESSARY.

SPRIGGING
GRAND TOTAL (S.F.) / 9 = S.Y.

SEEDING
GRAND TOTAL (S.F.) / 43,560 = ACRES

Note! This graph is for "**information only**". It is no longer required as part of the final plan assembly.

E.X.A.M.P.L.E

GRAPH FOR RATE OF PLACEMENT
PROJECT NO. _____
COUNTY _____

Show Correct Item Description & Approx. Rate per Sq. Yd. Here →

ITEM NO. _____SUPERPAVE
BITUMINOUS CONCRETE WEARING SURFACE
Approx. 150.LBS. PER SQ. YD. PER TON

1. **GRAPH FOR A SINGLE TWO LANE HIGHWAY**. Station No. of turnouts, stubs, intersections, extra widening, etc. should be listed in units as placed.

													TOTALS
Square Yards *	5013	4988	5020	5000	5010	5005	4990	5000	5070	4995	4990	4400	59481
Total Pounds	77200	724256	730912	816500	753504	733733	763969	781500	790920	765734	767462	683760	9084254 = 4542 Tons
Average per Sq. yd.	154.0	145.2	145.6	163.3	150.4	146.6	153.1	156.3	156.0	153.3	153.8	155.4	152.7
Distance (Lin Ft.)	1880	1875	1890	1850	1800	1700	1650	1840	1820	1860	1830	1620	21615
% Over	2.6			8.8	0.3		2.1	4.2	4.0	2.2	2.5	3.6	1.9
% Under		3.2	2.9			2.3							

Begin Project 0+00 18+80 37+55 56+45 74+95 92+95 109+95 126+45 144+85 163+05 181+65 199+95 216+15 **End Project**

* Those areas covered by Pay Items involving a Bituminous Leveling Course, Bituminous Base, Bituminous Binder, or Bituminous Wearing Layer includes work performed on the Roadway, Stubs, Turnouts, Intersections, Crossovers, Acceleration and Deceleration Lanes, Widening, Shoulders, etc. between stations indicated and shall be checked for approximately each 5000 sq. yds. to the nearest even truckload.

Same type graph to be made for items 327-E, 420, 423, 424 & 429 as defined in the 2000 edition of the ALDOT Standard Specifications, to include the placement and checking in accordance with item 410.03(f) as may apply.

Note: Total pounds in unit shall be the total pounds as shown on delivery tickets. Grand totals shall balance with all delivery tickets and converted to tons for pay purposes. Study item 410.03(f)1, 2000 Standard Specifications thoroughly. This is a sample graph and is to be used only as a guide in making up the distribution graph of plant mix placed on a contract in units of approximately 5000 square yards.
A separate graph is required for each layer placed and is to be submitted with the final plan assembly.

2. **GRAPH FOR A FOUR-LANE DIVIDED HIGHWAY.** Consider each roadway separately.

EXAMPLE:

LEFT ROADWAY

Square Yards *	5013	4988	5020
Total Pounds	772002	724258	730912
Avg. Per Sq. Yd.	154.0	145.2	145.6
Distance (Lin. Ft.)	1860	1875	1890
% Over	2.6		
% Under		3.2	2.9

Etc.

Begin Project 0 +00 18+80 37+55 56+45

RIGHT ROADWAY

Square Yards *	5010	5005	5020
Total Pounds	761520	741741	768562
Avg.Per Sq. Yd	152.0	148.2	153.
Distance (Lin. Ft.)	1890	1860	1725
% Over	1.3		2.1
% Under		1.2	

Etc.

Begin Project 0+00 18+90 37+50 54+75

NOTE: Item 410.03(f)1, 2000 Standard Specifications shall govern where tolerances are not in conformity to plan requirements. Designated rate per sq. yd. may be increased or decreased where conditions warrant. Any such increase or decrease shall be approved in writing by the engineer.

VACANT

ALABAMA DEPARTMENT OF TRANSPORTATION
PROJECT VOUCHER PAYABLE PAGE NO. 1

ESTIMATE NO.-1
PROJECT NO. BR-67(78) CONTRACT COMPLETION DATE - 04/20/2000
CODE NO. - 0 TARGET COMPLETION DATE - 06/20/2000
DIVISION DISTRICT COUNTY BIBB PERCENT TIME USED - 5.00
IN A/C WITH SMITH & JONES PERCENT COMPLETE - 6.75
BIRMINGHAM, AL
WORK PERFORMED FROM 3/28/2000 TO 4/20/2000 SOURCE CODE

DESCRIPTION	PERCENT COMPLETE	UNIT/ UNIT PRICE	THIS MONTH QTY	THIS MONTH AMOUNT	TO DATE QTY	TO DATE AMOUNT
ROADWAY CONTRACT PRICES						
CONTRACTOR: SMITH & JONES BIRMINGHAM, AL						
210A-000 UNCLASS. EXCAV.		CYIP 11.00	10565	116215.00	10565	116215.00
210D-011 BORROW EXCAVATION (A4 OR BETTER)		CYIP 13.25	1270	16827.50	1270	16827.50
214A-000 STRUCTURE EXCAVATION		CU YD 8.00	0	00	0	00

Worksheet Attached to Project Copy of Monthly Estimate
Estimate No. 1
Estimate Period 3/20/2000 - 4/20/2000

Item 210A-000, Unclassified Excavation

Paid 10565 CYIP
See Page 2 of Field Book No. 1

Item 210-D-011, Borrow Excavation (A4 or Better)

Paid 1270 CYIP
See Page 2 of Field Book No. 2

NOTE !
This Example Covers Estimates Submitted By Personnel Administering State Projects Utilizing Computer Generated Estimate Forms.

NOTE! A completely executed and notarized signature page of form 3 is required to accompany the final estimate

Field Book No. 1
Page 2

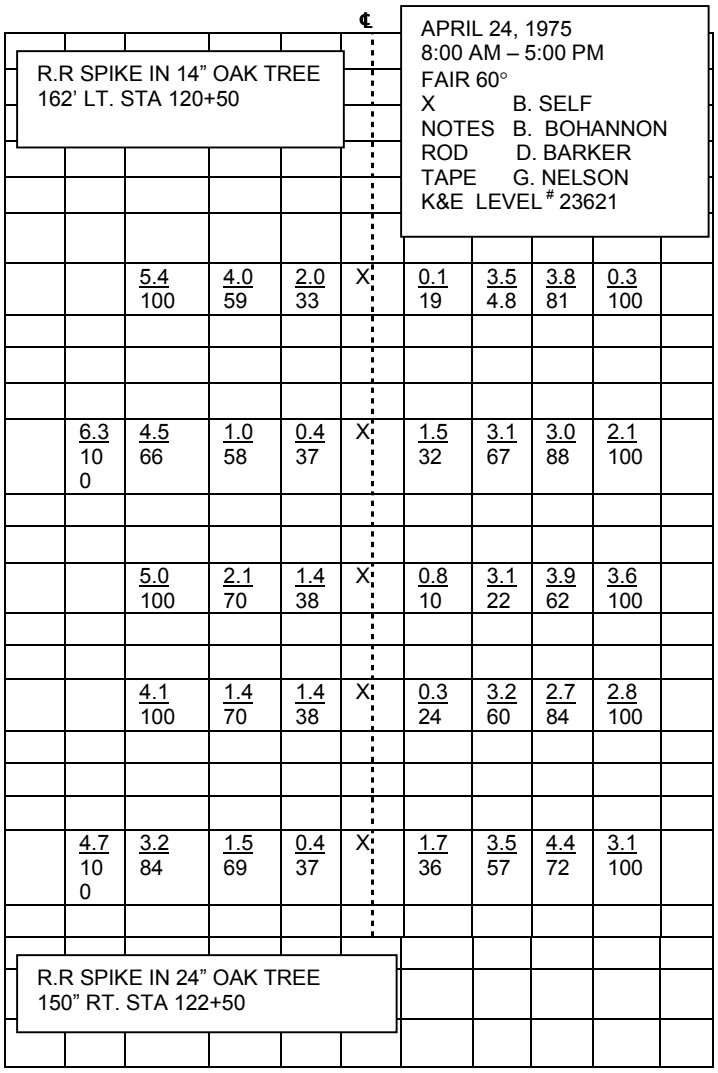
Sta.	Sta.	Length	CYIP	Date Excavated	
0+00	8+00	800'	4250	3/22/2000	
8+00	14+50	650'	6315	3/23/2000	Paid Est. No. 1

Field Book No. 2
Page 2

Sta.	Sta.	Length	CYIP	Date Excavated	
2+00	2+50	50'	1270	4/4/2000	Paid Est. No. 1

EXAMPLE SHEET FOR ORIGINAL CROSS SECTIONS

STA	(+)	H. I.	(-)	ELEV.	B. M.
B.M. NO. 4	12.41	611.25			598.84
120+00			5.1	606.1	
T .P.	13.25	623.48	1.02	610.23	
+50			12.4	611.1	
121+00			7.7	615.8	
+50			3.1	620.4	
T. P.	13.23	635.91	0.80	622.68	
122+00			11.8	624.10	
B.M. NO. 5			10.41	625.50	625.51

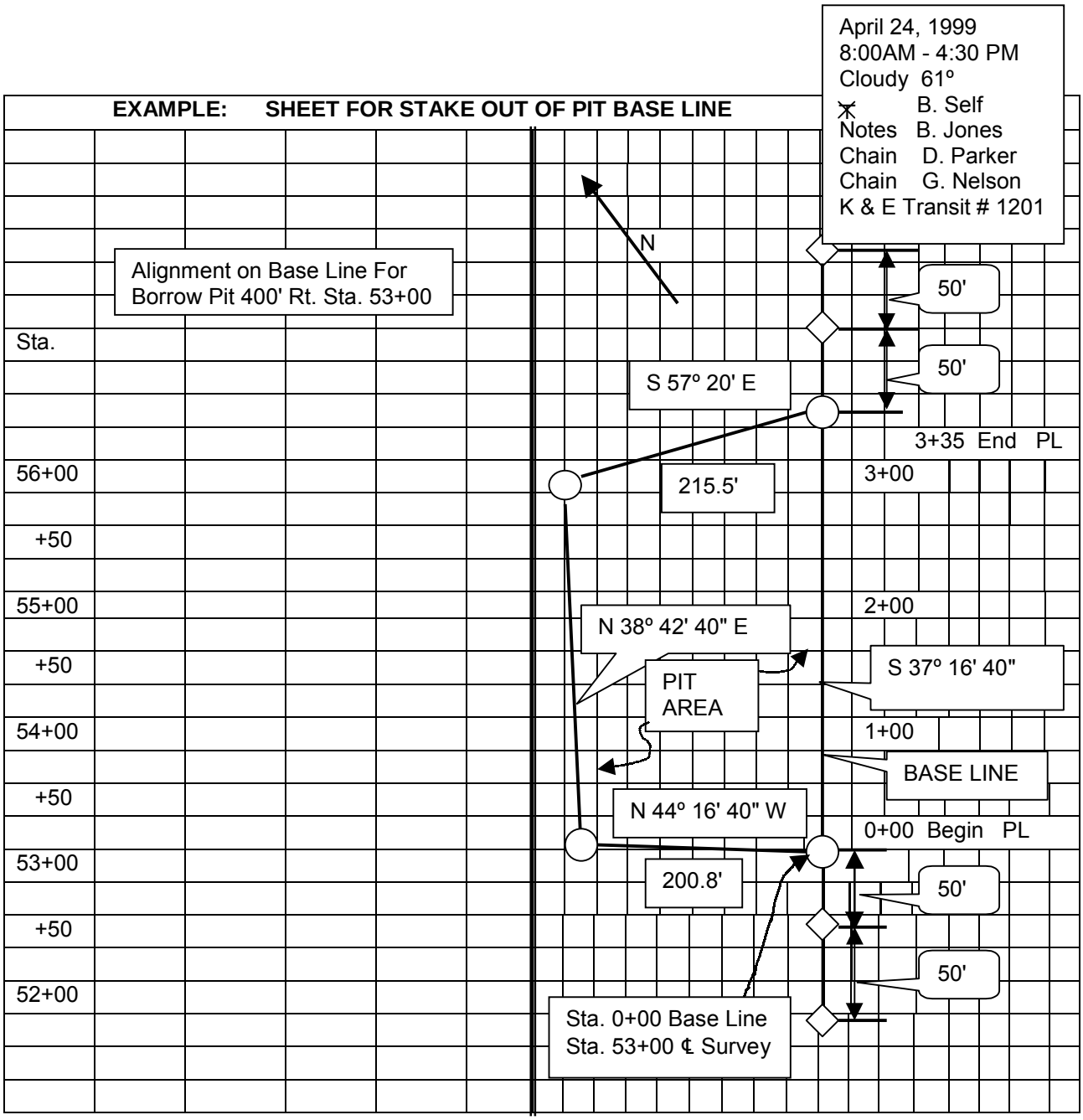


EXAMPLE SHEET FOR ALIGNMENT

STA		DEFL.	
12+00			
+50			
11+00			
+50			
10+00			
+64.40	P.T.	8° 02.5'	
+50		7° 51'	
9+00		7° 09'	
+50		6° 28'	P.I. STA 6+73.91
8+00		5° 47'	Δ = 16° 05' LT.
+50		5° 06'	D = 2° 45'
7+00		4° 24'	R = 2083.48'
+50		3° 43'	T = 294.36'
6+00		3° 02'	Lc = 584.85'
+50		2° 21'	
5+00		1° 39'	
+50		0° 58'	
4+00		0° 17'	
+79.55	P.C.	0° 00'	
+50			
3+00			
+50			
2+00			

APRIL 24, 1975
8:00 AM – 5:30 PM
FAIR 60°
T B. SELF
NOTES B. BOHANNON
CHAIN D. BARKER
CHAIN G. NELSON
K&E TRANSIT# 23621

EXAMPLE: SHEET FOR STAKE OUT OF PIT BASE LINE



EXAMPLE SHEET FOR PROFILE LEVELING

STA	+	H. I.	-	ELEV.	B.M. ELEV.
BM# 1	0.08	764.26			764.18
T. P.	7.09	758.54	12.81	751.45	
200+00			11.0	747.50	
+31			8.1	750.4	
201+00			7.7	750.8	
202+00			4.3	754.2	
T. P.	7.91	765.35	1.10	757.44	
203+00			4.1	761.3	
204+00			2.9	762.5	
+22			5.2	760.2	
205+00			1.8	763.6	
BM# 2	6.84	771.89	0.31	765.04	765.05
206+00			2.7	769.2	

U.S. GOV'T B.M. NO. P 272
ELEV. 764.18 A STANDARD
DISK SET IN TOP OF CONC.
POST 262' LT. STA 200+00

APRIL 22, 1975
8:00 AM – 5:00 PM
FAIR 75°
T B. SELF
NOTE B. BOHANNON
ROD D. BARKER
TAPE G. NELSON
K&E LEVEL #52150

R.R SPIKE IN BASE OF
24" OAK TREE 171' RT. STA.
205+50

EXAMPLE **FORM S.P. -1**

ALABAMA DEPARTMENT OF TRANSPORTATION
DAILY UTILITY RELOCATION REPORT

COUNT Tallapoosa DIVISION 4 DISTRICT 1 REPORT NO. 3 PROJECT NO. ST-111-4 DAY Monday DATE 2 – 7 - 77
UTILITY COMPANY Johnson Water Works
TEMPERATURE HI: 60 LO: 35 AV 50 LOCATION STA: 112+50 STA: 116+50

UTILITY PERSONNEL ON PROJECT

Name	Title	Hrs	Name	Title	Hrs
J. Jones	Foreman	8			
J. Blow	Pipefitter	8			
T. Brown	Welder	4.3			
B. Black	Operator	8			
T. Hall	Laborer	8			
J. Doe	Laborer	7			

MATERIAL USED THIS DATE (Quantity, Size and Kind)

400 6" C.I. Water Pipe
7 6" C.I. 45^0 Bends
4 6" C.I. sleeves
3 cu. yds. Concrete
10 cu. yds. concrete sand

RECOVERED MATERIALS (Reused, Salvaged, Scrap)

200' 6" C.I. pipe (scrap)	
200' 6" C.I. pipe (salvaged)	

UTILITY EQUIPMENT USED THIS DATE

KIND	SIZE	HRS	KIND	SIZE	HRS
Truck	½ ton	8			
Truck	1 ton	8			
Truck	1 ½ ton	8			
Backhoe (rubber tired)		7			
Welding Machine	240 amp	4			

REMARKS (Work Performed, Delays, Etc.)
Work performed reimbursable (or non-reimbursable). Laid 400' 6" C.I. water main. Work delayed 1 hour due to traffic. Work is approximately 2 days behind schedule. Mr. Johnson stopped on project today with his/her engineer, Mr. John Deer.

_____ _____
COMPANY REPRESENTATIVE **ALDOT INSPECTOR**

EXAMPLE

Form BC-101

INSPECTOR'S DAILY REPORT

Project No. I-20-1 (98) 106 Day & Date Thursday, March 18, 1977
Weather P.C. & Cool Temperature: High 68 Low 28
Work Day Time work started 7:00 Stopped 5:30 Hours worked 10
Contractor's forces: Supt: 1 Foreman 5
Operators 18 Laborers: Skilled 20 Unskilled 10 Others 2

Engineering Personnel: Tom Howard – 10 hrs.
Hugh Craft – 10 hrs.

Contractor's Equipment on Project

Number & Type	Operating	Not Operating	Reason not Operating
11 – Rollers	8	3	Not Needed.
5 – Patrols	5		
3 – Loaders	3		
2 – Draglines	2		
4 – Scrapers	1	3	Not Needed.
3 – Disc	3		
6 – Tractors	6		
24 – Trucks	20	4	Not Needed.
3 – Dozers	3		
1 - CMI	1		

DETAILS OF DAILY OPERATIONS

Soil Aggr Base -
Reworking with patrol, section previously cut with CMI Machine Rt Roadway
Sta. 285 – 416. CMI working ahead from Sta. 416
Checked template and stringline Sta. 385 – 416 Rt. Cored Sta. 386 to Sta. 404 Rt.
Subbase-
Patrol blading up shoulder washes and redisking to consolidate back into subbase
Sta. 530 to Sta. 660, Rt. Roadway
Continued Stockpiling Subbase material Lt. Of Sta. 660 to Rt. Lane
Modified Roadbed-
Shaped to Blue-Tops, Stringline and compactions Lt. Sta. 530 to Sta. 543
Disking to help dry out Lt. Sta. 543 – 562
Mixed Lt. Broadway Sta. 730 to Sta. 744
Roadbed Stabilization-
Started re-shaping Rt. Roadway Sta. 740 to Sta. 87 and Ramp "B" at Ala. +9
Interchange
No Rock Crew this date

/S/ Tom Howard
Inspector

Visitors : Mr. Smith, Mr. Jones, Mr. Doe – AHD
Mr. Jones, Mr. Brown – FHWA

BMT-38
(Rev. 6-76)

STATE OF ALBAMA DEPARTMENT OF TRANSPORATION
BUREAU OF MATERIALS AND TESTS

SUMMARY OF TESTS

Project No._____ County _____ _____

Laboratory numbers and quantities of all tested materials incorporated in this project are listed below under the item in which they were used. This report covers all items in which tested materials are required. Test reports are attached to back of each sheet.

_____ _____
Project Engineer Division Engineer

Type of Material:_____

LAB. NO.	QUANTITY	LAB. NO.	QUANTITY	LAB. NO.	QUANTITY

Show total quantities tested for each item.

Page _____of_____

Total Quantities_____

BMT-38
(Rev. 6-76)

SUMMARY OF TESTS

CONTINUATION SHEET

Type of Material:_____

LAB. NO.	QUANTITY	LAB. NO.	QUANTITY	LAB. NO.	QUANTITY

Show total quantities tested for each item.

Page _____of_____

Total Quantities_____

Form C-30

MONTHLY ESTIMATE DOCUMENTATION

Project No.:_____ County:_____ Page No.: _____

Item Number: Item Description:

Contract Quantity: Unit Price: Unit: Decimal Point For Payment:

Date	Location Where Work Performed	Quantity This Date	Quantity To Date	Quantity Paid	Est. No.	Reference	Test Report Quantity This Date	Test Report Quantity To Date

Table for Calculating Shoulder/Slope Widths.

Coefficient Factors (F)	Shoulder Slopes				FORMULA;
	1/8"/Ft	1/4"/Ft	1/2"/Ft	3/4"/Ft	SHLDR DIST. = THICKNESS / (FRONT SLOPE - SHLDR SLOPE) + SHLDR WIDTH
Front Slopes	0.0104 Ft/Ft	0.0208 Ft/Ft	0.0417 Ft/Ft	0.0625 Ft/Ft	
$1^1/_2$: 1	1.52	1.55	1.60	1.66	(T) = Thickness
2:1	2.04	2.09	2.18	2.29	(F) = Coefficient Factor
$2^1/_2$:1	2.57	2.64	2.79	2.96	
3:1	3.10	3.20	3.43	3.69	
$3^1/_2$:1	3.63	3.78	4.10	4.48	
4:1	4.17	4.36	4.80	5.33	
$4^1/_2$:1	4.72	4.97	5.54	6.26	
5:1	5.27	5.58	6.32	7.27	
$5^1/_2$:1	5.83	6.21	7.14	8.38	
6:1	6.40	6.86	8.00	9.60	

Example:

What is the Shoulder Distance, if the thickness of the base buildup is 1.65 ft, the front slope is 4:1, the shoulder slope is 3/4 / Ft. and the shoulder width is 10 Ft.?

USING THE OLD FORMULA:

$$\text{SHLDR DIST.} = \frac{\text{THICKNESS}}{\text{FRONT SLOPE} - \text{SHLDR SLOPE}} + \text{SHLDR WIDTH}$$

$$\text{SHLDR DIST.} = \frac{1.65}{1/4 - 0.0625} + 10\text{ Ft}$$

$$\text{SHLDR DIST.} = \frac{1.65\text{ Ft}}{0.1875} + 10\text{ Ft} = 18.80\text{ Ft}$$

USING THIS CHART

$$\text{SLDR DIST} = F \times T + \text{SHLDR WIDTH}$$

$$\text{SHLDR DIST} = 5.33\ (1.65) + 10\text{ Ft.}$$

$$\text{SHLDR} = 18.80\text{ Ft.}$$

1:3:B:1.12 FIELD DATA BOOKS.

All field notes should be recorded in standard Engineer's Field and Level Books. Surveying field notes are the permanent records of work done in the field. They should be kept with the fact constantly in mind that they are permanent documentary records. If the notes are incomplete, incorrect, or destroyed, much or all of the time spent in making accurate measurements may be lost.

Accordingly, it is essential that notes be intelligible to others without verbal explanations. All measurements made should be in keeping with good engineering practice and made in such manner that they may be used for correct computations. Notes, figures, and sketches should be neat and clear, and in sufficient detail to be understood by someone not familiar with the project. All field books should be plainly labeled for identification with the name of owner, project number, type data and year.

Original notes are those taken while measurements are being made. All other sheets are copies and must be marked. Copied notes may not be accepted in court. They are always subject to suspicion because of the possibility of errors and omissions. Note keepers are tempted to scribble notes on note pads for later transference in neat form to the regular field book. **This practice will not be tolerated by the Department**. The Project Engineer should warn all personnel responsible for note keeping to avoid this practice.

Notes should be lettered with a pencil of at least 3H hardness. Books so prepared will withstand damp weather in the field and still be legible, whereas graphite from a soft pencil will leave an undecipherable smudge under such circumstances. Erasures are not to be permitted in field books. If a number has been recorded incorrectly, a line should be drawn through it without destroying its legibility, and the correct value noted above. The person making the correction should initial it. If an entire page is to be deleted, draw diagonal lines from opposite corners and letter "VOID" prominently on the page.

Advance planning and proper field procedures are necessary to insure clarity of sketches and tabulations, and to make errors and omissions more evident. Note forms appropriate to the particular survey contribute to accuracy, integrity, and legibility.

Four types of notes are kept in practice: (1) sketches, (2) tabulations, (3) descriptions, and (4) a combination of these. The most common type is a combination form, but an experienced recorder selects the version best fitted to the job at hand. In note keeping, this axiom is always pertinent: "When in doubt about the need for any information, include it and make a sketch." Some sample note forms are included herein to aid in preparing uniform and complete records, which can be checked quickly.

To permit ready location of desired data, each Field Book must have a table of contents at the beginning, and this should be kept current as data is entered.

The following are some suggestions for recording field notes:

(1) Letter the name of owner, project number, type book and year on the cover and first inside page.

(2) Use the Reinhardt system of lettering. Reserve uppercase letters for emphasis.

(3) Use a 3H or harder pencil.

(4) Carry a straightedge for ruling lines, and a small protractor for laying off angles.

(5) Always record directly in the field book, rather than on a note pad for copying later.

(6) Do not erase recorded data. Draw a single line through an incorrect entry so that it is still legible, and place the correct value above it. Void an entire page by drawing diagonal lines to the corners of the page. The person making the corrections should initial each change.

(7) Make sketches to general proportions, rather than exactly to scale or without plan.

(8) Exaggerate details on sketches if clarity is thereby improved. Avoid crowding. Employ conventional symbols and signs, for compactness.

(9) Run notes down the page except in route surveys, where they progress upward to conform with the sketches.

(10) Line up descriptions and sketches with corresponding numerical data. For example, the beginning of a bench mark description should be placed on the same line as its elevation.

(11) Place a north arrow on all sketches.

(12) Keep tabulated figures inside the column rulings, with the decimal points and digits in line vertically.

(13) Place a zero before the decimal point for numbers less than one. For example, record 0.75 instead of .75.

(14) Show the precision of measurements by recording significant zeroes. For example, show 7.50 instead of 7.5 if the reading was actually determined to hundredths.

(15) Make all possible arithmetic checks on the notes, and record them before leaving the field.

(16) The following items should be placed in the upper right-hand corner of the right page for each entry:

a. Date, time of day (AM or PM), starting and finishing time.
b. Weather.
c. The names and duties of members of the party.
d. Instrument type and serial number.

In addition to the project diaries and survey books, the Project Engineer shall keep or cause to be kept, books showing complete records of measurements on all appropriate pay items in the contract. The type of record and the numbers of books required will vary depending on the pay item. The same book may be used for documentation of several items so long as each item is clearly explained and separately listed. A logical and uniform method of keeping records is one of the Project Engineer's principal duties.

1:3:B:2.1 SUBMISSION OF FINAL ESTIMATE DATA FOR DIVISION OFFICE REVIEW.

The Project Engineer should always pride himself/herself in prompt and accurate preparation and submission of the Final Estimate Data. He/she should, if at all possible, complete the determination of each pay quantity as soon as that item of work has been completed by the Contractor. He/she should never wait until after the project is completed and accepted before starting the preparation of the Final Estimate. It is imperative that the Final Estimate Data be processed with the least possible delay upon completion of the project. The Engineer will within 60 calendar days after the date of final inspection prepare the list of final quantities and submit by certified letter, return receipt requested, the list of final quantities to the Contractor for his review and concurrence.

By following the procedure of submitting final quantities piecemeal as they are completed, it is felt that in most cases the final quantities can be determined within 30 days after Final Acceptance of the project. As each pay Item is completed by the Contractor, the final quantity should be determined by the Project Engineer and payment made on the current estimate. As soon as several Pay Items are completed and all computations checked, they should be submitted to the District Engineer for his/her review and then forwarded to the appropriate Assistant Division Engineer for the Division Review. A letter of transmittal listing these quantities and all supporting data should accompany the data, including a Summary of Quantities Sheet covering the items submitted. By following this policy, it is possible for the Contractor to secure reimbursement without undue delay and personnel preparing the Final Estimate Data can be released for transfer to other projects sooner.

After the Division Office has checked the quantities submitted, a letter shall be written to the District Engineer listing the quantity for each item. If there are discrepancies between field and office quantities on any item, these items will be listed in the letter showing the Field Total and Office Total along with the reason for changing the Field Total. The Project Engineer should receive a copy of this letter

The District Engineer and Project Engineer should check the Office Totals, and in the event they do not agree with these totals, they should arrange to visit the Division Office to discuss the differences in order that an agreement can be reached prior to the submission of the final quantities to the Contractor.

Upon completion of the project, all Final Estimate Data, including the Final Plan Assembly, field data books, project files, Project Diaries, Inspectors' Daily Reports, supporting documents and computations for all quantities, supporting data for all Force Account Work, etc., should be submitted to the Division Office for review and storage.

The Final Estimate Data should be accompanied and supported by a complete set of project plans, altered to show all construction changes. The plans should be labeled **"FINAL PLANS AS CONSTRUCTED."** This set of plans is to be kept in the Division Office for future reference. A letter of transmittal listing all data submitted must accompany the Final Estimate Data.

1:3:B:2.2 DIVISION OFFICE REVIEW.

The following procedure is recommended for Division Office personnel responsible for reviewing the Final Estimate Data.

1:3:B:2:3 RESPONSIBILITY.

Blank.

1:3:B:2.4 SUGGESTIONS FOR CHECKING FINAL ESTIMATE

(1) Upon receipt of the Final Estimate Data, a check should be made to see that all data listed in the District Engineer's letter of transmittal is included.

(2) Check to see if each Pay Item listed on the Summary of Quantities Sheet has a reference indicating where the determination of the final quantity can be found in the Final Estate Data.

(3) The Final Estimate Data should be accompanied by a complete set of plans for the project. These plans should be labeled "Final Plans as Constructed." Examine the plans to determine if they reflect the revisions made on construction.

(4) All items in the Contract should be checked for accordance with the Plans, Special Provisions, Standard Specifications, Supplemental Agreements and approved Construction Change Orders for the project.

(5) The Guidelines included in the Item List contained herein are recommended for use by personnel engaged in checking and verifying the final quantity on each Pay Item in the Contract.

(6) When an error is discovered, the computation and quantity concerned should be verified by someone else before making a change in the final quantity.

(7) If possible, different techniques or methods should be used to verify the quantities.

(8) The person who checks a given quantity on the Summary of Quantities Sheet should place his/her initials by that quantity.

1:3:B:2.5 SECURING APPROVAL OF FINAL QUANTITIES.

As soon as all quantities have been checked by the Division Office, a list of the final quantities will be sent to the District Engineer. The letter of transmittal should include an explanation of any changes made in the Field Totals. Where quantities have been submitted piecemeal for checking, it will not be necessary to list the reasons for changes again.

The letter should request the District Engineer to review the quantities with the Project Engineer and it they disagree with any of the Office Totals to contact the Division Office so that an agreement can be reached.

As soon as an agreement is reached, the District Engineer shall submit by certified letter return receipt requested, the list of final quantities to the Contractor. The Contractor will have 45 days from date of receipt to either concur or advise the District Engineer of any disputes in the quantities. Should the Contractor fail to respond within the 45 days, the quantities will be considered acceptable and no further contacts should be made with the Contractor concerning this issue. The District Engineer will notify the Division Office by letter of the Contractor's action.

Upon notice from the Contractor of a dispute in any quantities, the Division Engineer will promptly attempt to resolve these differences, but should he/she be unable to do so, he/she will refer the matter to the Central Office for consideration by the Construction Bureau Chief and appropriate response to the Contractor.

The Final Plan Assembly and all supporting data should be stored in the Division Office or some other safe place for future reference and audit.

1:3:B:2.6 SECURING FINAL ESTIMATE DOCUMENTATION

The certified letter to the Contractor forwarding the final quantities for his/her review and concurrence should also direct the Contractor to furnish the following documentation, as applicable:

(1) A non-resident Contractor must provide a certified "statement of good standing" from the State Department of Revenue and the appropriate County and/or City authority. This statement certifies that the non-resident Contractor has paid all taxes due and payable to the State of Alabama or any political subdivision thereof. See Section 39-2-12 of the Alabama Code.

(2) Proof of publication of advertisement of project completion as per Item 105.15(c)3.

(3) A signed affidavit attesting that all known debts for labor and materials used on the project and all approved sub-contractual obligations associated with the construction of the project have been paid or will be paid within five days after final payment. The affidavit shall be on a standard form furnished by the Department **(Form C-23).**

(4) A certification of actual payments to DBE Firms. This certification requires sign off by the Prime Contractor and the individual DBE firms involved on the project.

The Contractor should be directed to furnish this data to the Division Office.

1:3:B:3.1 PROCESSING THE FINAL ESTIMATE.

The procedure noted hereinafter is recommended for processing the Contractor's Final Estimate.

1:3:B:3.2 PREPARATION OF THE FINAL ESTIMATE VOUCHER.

The Project Engineer shall, upon receipt of a copy of the letter listing the approved final quantities, prepare a work copy of the Final Estimate Voucher. This voucher, along with all other related data, should be reviewed and submitted by the District Engineer to the Division Office for checking.

It shall be the responsibility of the Project Engineer to see that the following data shall accompany the Final Estimate Voucher to the Division Office:

(1) Analysis of Overruns and Underruns will provide a detailed explanation of all contract items which overrun or underrun the original plan quantity, or a revised quantity amended by supplemental agreement, by more than 15 percent.

(2) Structure Releases.

(3) Material Pit Releases (**Form C-17-C**) (State optioned pits).

(4) Time Statement for Federal Aid and State Projects.

(5) Summary of Time Charges.

(6) Summary of Tests (**Form BMT-38**) with a copy of Test Reports to cover all materials used on the project.

(7) Copy of District Engineer's certified letter to Contractor requesting concurrence with final project quantities and copy of Contractors reply or notification by the District Engineer that the Contractor did not respond within 45 days.

(8) All other supporting data that has not been submitted previously.

1:3:B:3.3 DIVISION REVIEW OF FINAL ESTIMATE VOUCHER AND RELATED DOCUMENTATION

For the Division review, the following procedure is recommended:

(1) Check the Contractor's name, address, etc.

(2) Check the dates (date work began and date of final acceptance).

(3) Check the estimate number, project number and code number.

(4) Check the description, unit, and price of each item against the Detailed Estimate and/or Proposal and any Supplemental Agreements.

(5) The "To Date Quantity" should be verified by the approved list of final quantities.

(6) The "To Date Quantity" should be compared with the previous monthly estimate quantity. The difference should be shown in the "This Month Quantity' column on the Final Estimate Voucher.

(7) Check all major items to see if they overrun or underrun more than allowed by the Standard Specifications (See Article 104.02).

(8) The "quantity" times "unit price" extensions should all be checked.

(9) Check the total, previous payments.

(10) Check all itemized statements, invoices, computations and certificates covering Force Account Work.

(11) Check the time charges, determine if there are any Extensions of Contract Time and if there are additional Liquidated Damages, charge them against this voucher.

(12) Review the Analysis of Overruns and/or Underruns to determine if the explanation is valid.

(13) Request the Division Materials Engineer to check the Summary of Tests, with Test Reports attached, to see if sufficient quantities of materials were tested to cover the quantity used for each particular item.

(14) Check to see if there is a Material Pit Release for each State optioned pit.

(15) Check to see if there is a Structure Release for each structure that was relocated.

(16) Verify receipt of applicable supporting documentation as listed in 1:3:B:2.6.

1:3:B:3.4 SUBMISSION OF FINAL ESTIMATE VOUCHER TO THE CONTRACTOR

Upon completion of the Division's review of the voucher and determination that all required documentation is on hand, the voucher is ready for submission to the Contractor. The final estimate voucher shall be typed and proofread. The original shall be submitted to the Contractor by certified letter, return receipt requested, for his/her signature and notarization by a Notary Public.

The Contractor shall have thirty (30) calendar days from the date of receipt to return the voucher fully executed. If the Contractor fails to return the voucher within the specified time, the Division should contact the Construction Bureau to determine the appropriate action to be taken.

1:3:B:3.5 SUBMISSION OF FINAL ESTIMATE TO THE CENTRAL OFFICE.

The voucher, upon receipt by the Division Office, should be stamped with its received date. The voucher is then approved and signed by the Division Engineer. The final estimate data should then be assembled into the original and four copied sets, each containing the following:

(1) Final Estimate Voucher + (Notorized Signature Page of Form 3).

(2) Analysis of Overruns and Underruns.

(3) **Form SJ-120**.

(4) **Form SJ-120-A-OE** (only on working days construction time).

(5) Affidavit of Publication of Project Completion.

(6) **Form C-23**.

(7) Certificate for Federal Aid Secondary Projects under the 1954 Secondary Road Plan.

(8) Certified “Statement of Good Standing” (if required).

The original and three copied sets shall be submitted to the Bureau of Construction. The other set shall be retained in the Division office files. A copy of the Final Estimate Voucher shall be forwarded to the Contractor, the District Engineer and the Project Engineer for their files.

PART: 1 SECTION: 3	ARTICLE: C	SUB-ARTICLE:	PAGE: 1 of 4
DATE ISSUED: October 15, 2000		REVISION DATE:	

SUBJECT: CONTRACT ADMINISTRATION "Construction Reports and Records"
Construction Forms Originating from Division, District or Project Office

NOTE! In subarticle 1:3:C as listed below and on the following two pages are the forms for which sample copies appear within Subarticle 1:3:C:1.2 of this unit.

FORM NO.	FORM TITLE or REFERENCE	PAGE
AL-100	Statement of Wage Compliance	1-221
AL-150-OE	Statement of Prime and Subcontractors on Projects	1-222
BC-101	Daily Inspector's Report	1-223
	Project Diary	1-224 - 1-227
BM-103	Listing Of Personnel	1-228
BMT-4	Plant Mix Daily Placement Report	1-229
BMT-6	Field Inspectors Material Report	1-230
BMT-21	QC/QA Mat Density Report	1-231
BMT-23	Settlement Plate Measurement	1-232
BMT-36	Bituminous Distributor Daily Report	1-233
BMT-38	Summary of Tests	1-234
BMT-55	Insp. Daily Report - Thin layer Gauge Compaction	1-235
BMT-57	Insp. Daily Report - Roadway Compact. (Nuclear Probe)	1-236
BMT-60	Final Field Insp. of Corrugated Metal pipe	1-237
BMT-65	Asphalt Content Guage Worksheet	1-238
BMT-66	Asphalt Content Gauge Calibration Worksheet	1-239
BMT-73	Material Guaranty	1-240
BMT-78	Rate of Spread and Pulverization of Lime Stabilized Soil	1-241
BMT-79	Chart for Calculating Pounds Lime Req. Per Lin. Ft. Rdwy.	1-242
BMT-83	Concrete Placing Daily Report	1-243
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SUBJECT: CONTRACT ADMINISTRATION "Construction Reports and Records"
Listing of various forms which may or may not be retained or received by a Division, District or Project Office dependent upon type of work being performed.

NOTE! The Following Forms are Listed for Informational Purposes Only. No Copies of these Forms are included for Examples.

FORM NO.	FORM TITLE or REFERENCE
BMT-3	Core Density Report
BMT-5	Soils and Base Course Analysis
BMT-9	Concrete Placement and Testing Report
BMT-10	Certified Aggregate Shipping Ticket
BMT-11	Plant Mix Extraction Report.
BMT-16	(Insp. Report) Analysis on Sample of (_____)
BMT-19	Wk. Sheet. Sum. of Lot Test Results for Air Voids and AC Cont.
BMT-20	Asphalt Plant Mixture Test Report
BMT-30	Lab Worksheet for Soils
BMT-33	Aggregate Work Sheet and Test Report
BMT-45	Annual Cert. And Guarantee for Pre-Cast Concrete Products
BMT-47	Conc. Pipe and Pre-cast Culvert Test and Insp. Report
BMT-53	Pre-cast manhole, Box Culvert & Misc. Pre-cast Insp. Report
BMT-58	Proctor Density Compaction Sheet
BMT-58-A	Lab. Vibrated Density Compaction Sheet
BMT-72	Pre-cast Concrete Products – Shipping Report
BMT-82	Concrete Plant Inspector's Worksheet and Daily Report
BMT-86	Report of Tensile Test of Reinforcing Steel
BMT-91	Quality Control Program. – Aggregate Test Report
BMT-95	Periodic Concrete Plant Check List
BMT-108	Plant Inspection Report for Cast AASHTO Girders
BMT-109	Plant Insp. Report for Pre-cast Pre-stressed Conc. Bridge Item
BMT-114	Certified Cement Shipments
BMT-122	Concrete Batch Ticket
BMT-123	Test Boring Record
BMT-139	Shipping Notice – Pre-stress Concrete Bridge Members
BMT-146	Bituminous Material Certificate of Compliance
BMT-148	Welder Qualifications
BMT-167	Aggregate Gradation Chart
BMT-380	Worksheet to Determine Pay Factors When They Cannot Be Determined From Verification Samples

Form No. & Description	Proj. Eng. to Dist. Eng.	Dist. to Div.	Div. To Const. Bureau	Frequency of Submission	Remarks
AL-100 **Statement of Wage Compliance**	Note: Project Engineer should receive 3-copies from the Contractor and each Subcontractor along with their labor payrolls. Project Engineer should submit 2-copies to the Division Office. Division Office submits 1-copy with original signatures to State Office Engineer. Division should retain original document.			With each Payroll	
AL-150-OE **Statement of Active or Inactive Status**	Same as AL 100, but must be submitted only by the Prime Contractor after Subcontractors have been approved. Division should retain original document.			With each Payroll	
BC-101 Daily Inspectors Report	Original retained by the inspector with yellow carbon placed in project file.			Daily	Should be completed for each operation each day. On smaller projects one report per inspector may be sufficient.
Project Diary	Retained in Project Files.			Submitted only with Final Plan Assembly.	Completed daily by office personnel from a review of daily inspector's reports. May be completed by Project Engineer for smaller projects. In either case, it must be reviewed and signed daily by the Project Engineer.
BM-103 Listing of Personnel	2	1		Monthly	
BMT-4 Plantmix Daily Placement Report	2	2	1*	Daily	Completed daily by Project Personnel, it must be reviewed and signed by the Project Engineer.
	* Division will submit 1 copy to Bureau of Materials & Tests				

Form No. & Description	Proj. Eng. to Dist. Eng.	Dist. to Div.	Div. To Const. Bureau	Frequency of Submission	Remarks
BMT-6 Field Inspector's Material Report	2	2		Daily	Completed by Division Laboratory Personnel.
BMT-21 QC/QA Mat Density Report	2	1		Daily	Completed daily by Project Personnel.
BMT-23 Settlement Plate Measurement	4	3	1* * Note: Submit 1-copy to Bureau of Materials & Tests	Weekly	
BMT-36 Bituminous Distributor Daily Report	3	2	1*	Daily	
	* Division will submit 1-copy to Bureau of Materials and Tests.				
BMT-38 Summary of Tests	2	2	1* * Submit 1-copy to Bureau of Materials & Tests. (See note at Right)	Submitted with Final Estimate Assembly.	Should be maintained daily as test reports are received in Project Office and therefore complete at the time of Project completion. Checked by Division after final quantities are verified and then submitted to Bureau of Materials and Tests for checking.
BMT-55 Insp. Daily Report - Thin Layer Gauge Compaction	2	2		As Needed	Completed daily by Project Personnel, reviewed and signed by Project Engineer.

Form No. & Description	Proj. Eng. to Dist. Eng.	Dist. to Div.	Div. To Const. Bureau	Frequency of Submission	Remarks
BMT-57 Insp. Daily Report - Roadway Compaction (Nuclear Probe)	2	2		Daily	Completed daily by Project Personnel, reviewed and signed by Project Engineer.
BMT-60 Final Field Insp. Of Corrugated Metal Pipe	2	2		As Needed	Completed daily by Project Personnel, reviewed and signed by Project Engineer.
BMT-65 Asphalt Content Gauge Worksheet				Daily	Contractor and ALDOT Personnel complete form and place in Plant File.
BMT-66 Asphalt Content Gauge Calibration Worksheet				As Needed	Contractor and ALDOT Personnel complete form and place in Plant File.
BMT-73 Material Guaranty	2	1		As Needed	Completed by Project Personnel and signed by Contractor.

Form No. & Description	Proj. Eng. to Dist. Eng.	Dist. to Div.	Div. To Const. Bureau	Frequency of Submission	Remarks
BMT-78 Rate of Spread and Pulverization of Lime Stabilized Soil				As Needed	Completed by Project Personnel and reviewed by Project Engineer. (Used as a worksheet).
BMT-79 Chart for Calculating Pounds Lime Req. Per Lin. Ft. Roadway				As Needed	Completed by Project Personnel and reviewed by Project Engineer. (Used as a worksheet).
BMT-83 Concrete Placing Daily Report	3	2	1*	Daily	Completed by Project Personnel, reviewed and signed by Project Engineer.
	* Note: Division will submit 1-copy to Bureau of Materials and Tests.				
BMT-90 Statement of Receipt of Radioactive Materials	Completed by Radioactive Safety Officer. 1-copy submitted to: Project Engineer Division Materials Section Bureau of Materials & Tests			As Needed	**Note:** Place 1-copy in box with machine. Place 1-copy in vehicle used to transport machine.
BMT-92 Daily Report Traffic Stripe	1	1		As Needed	Completed by Project Personnel, reviewed and signed by Project Engineer.

Form No. & Description	Proj. Eng. to Dist. Eng.	Dist. to Div.	Div. To Const. Bureau	Frequency of Submission	Remarks
BMT-97 Worksheet to Calculate Mat Density Lot Pay Factor	1	1		As Needed	Completed by Project Engineer.
BMT-112 Insp. Worksheet for Control Strip Density-Moist./Nuclear Probe	1	1	1* * Submit 1-copy to Bureau of Materials & Tests.	As Needed	Completed by Project Personnel, reviewed and signed by Project Engineer.
BMT-113 Insp. Daily Test for In-place Density - Moisture	1	1		As Needed	Completed by Project Personnel, reviewed and signed by Project Engineer.
BMT-117 Monthly Quantities of Concrete	1	1	1* * Submit copy to Bureau of Material & Tests.	Monthly	Completed by Project Personnel, reviewed by Project Engineer.
C-7-C Tickets of Loads Hauled.	Retained in project files for documentation of payment.			As Needed	Used as documentation for materials paid on a loose volume basis. Tickets punched and signed by inspector at jobsite. Complete only applicable portions.

Form No. & Description	Proj. Eng. to Dist. Eng.	Dist. to Div.	Div. To Const. Bureau	Frequency of Submission	Remarks
C-10 Progress Schedule of Operations.	Submitted to Division Office by Contractor. Division returns approved copy to Contractor and sends copies to District Engineer and Project Engineer.			Submitted at or prior to Pre-construction Conference.	Revised schedules may be required at each major change from original schedule, when a time extension is granted, or as requested by the Engineer.
C-13-C Project Record					May be utilized by Central, Division, or District Offices to maintain information pertinent to Contract Construction Projects.
C-14 Pile and Driving Equipment Data Form	Note: Contractor shall submit directly to the Materials and Tests Engineer with a copy to the Project Engineer.			30 days prior to driving piles.	No pile driving can be done until approval of this form is received from the Bureau of Materials and Tests.
C-15A **&** **C-15A-2** Test Pile Record & Continuation Page	6	5*	3	Upon completion of Load Test.	A sketch should be drawn on the report showing the location of the test pile. * 1 copy to Division Chief Bridge Inspector.
C-15B **&** **C-15B-2** **&** **C-15B-3** Pile Loading Record-Quick Load Test, Continuation Page & Graph	6	5*	3	Upon completion of Load Test.	A sketch should be drawn on the report showing the location of the load test. Attach the test pile record of the pile that was loaded to the corresponding pile loading record. Complete and attach graph to the corresponding pile loading record. * 1 copy to Division Chief Bridge Inspector.

Form No. & Description	Proj. Eng. to Dist. Eng.	Dist. to Div.	Div. To Const. Bureau	Frequency of Submission	Remarks
C-15C Proposed Pile Lengths	Note: Contractor shall submit to the Project Engineer.			Upon completion of load test.	For steel piles the Project Engineer shall review and make distribution as shown on form. For concrete piles the Project Engineer should submit forms to the Bureau of Materials and Tests State Geotechnical Engineer for approval.
C-16 Driving Record of Piling	6	5*	3	Upon completion of structure.	A sketch should be drawn on the report showing the location of the piling. * 1 copy to Division Chief Bridge Inspector.
C-17C Pit Release	2	1		As needed	Utilized only for ALDOT obtained pits.
C-18-C Construction Inspection Report. Fed aid County Projects.	Submit copies to State County Transportation Engineer, State Office Engineer, and County Engineer.			Monthly	Completed monthly by a Division Representative.
C-19C Time Extension Request	3	2	1*	As needed	Submitted as needed when time extension requests have been given prior approval by Construction Bureau. * 1 full set of support documentation should be submitted with this copy.
C-20 Progress Report	2	1	1*	Monthly	Original to be mailed to contractor, 1-copy to Project Superintendent.
	* Note: Division will maintain copies of Monthly forms in Project File.				

Form No. & Description	Proj. Eng. to Dist. Eng.	Dist. to Div.	Div. To Const. Bureau	Frequency of Submission	Remarks
C-21 Partial Payment of Stored Materials.	Parts A & B prepared by Inspector responsible for inspection of stored materials and submitted to Project Engineer. Project Engineer completes Part C. Part D completed by project personnel.			As needed Must be requested in writing by the Contractor.	Retain in Project File.
C-22-C Source Validation Tickets	Retained in Project Files as double validation of C-7-C tickets.			Daily	Tickets punched in the pit source for each load. Complete only applicable portions.
C-23 Affidavit for Payment of Debts on Construction Projects.	6	5	4	Submitted with final estimate.	
C-24 Daily Report of Railway Inspection/ Flagging**.**				Daily	Complete each day and maintain in Project file for checking of railway invoice and for permanent record.
C-25 Daily Inspection report of Traffic Control Devices.	Submitted weekly by Project Traffic Control Inspector to Project Engineer For review and signature..			Weekly	To be retained in Project Files.
C-26 Bituminous Material Price Adjustment.	Project Engineer should complete monthly and retain in his/her file for documentation of payment. Forms should be submitted with Final Estimate Assembly for checking.			With Final Estimate	Construction Bureau will furnish Asphalt Index each month.

Form No. & Description	Proj. Eng. to Dist. Eng.	Dist. to Div.	Div. To Const. Bureau	Frequency of Submission	Remarks
C-27 Construction Fuel Cost and Adjustment	Project Engineer should complete for each increment payment and retain in his file for documentation of payment. Forms should be submitted with Final Estimate for checking.			With Final Estimate	The Construction Bureau will furnish Fuel Index each month. If the estimate period closes between the 1st and 5th of the month (inclusive), the last month's index shall be used. If the estimate period closes between the 6th and 31st, the current month's index shall be used.
C-30 Monthly Estimate Documentation	Accounting for each pay item in Project Contract. Maintain in Project Files for duration of project.				Use separate sheet for each pay item in contract. Maintain in binder titled "Monthly Estimate Register".
C-34 Stormwater Inspection Certification Report	3	2	1* * Division submits 1-copy to ALDOT Stormwater Coordinato r in Design Bureau.	After 12 months (Annually) or completion of project, whichever comes first.	1st inspection due 14 days after project begins. Afterwards monthly, or following a ¾" rain. Maintain in Project Office Files for duration of project even if permit is terminated. Division should retain file and records for a 3 year period following project completion or the termination of permit.
C-35 & C-35-2 Drilled Shaft Pouring Record and Graph	6	5*	3	Upon completion of shaft	A sketch should be drawn on the report showing the location of the shaft. Complete and attach copy of graph to Drilled Shaft Pouring Record. * 1 copy to Division Chief Bridge Inspector.
C-37 Stormwater Noncompliance Notification Report	3 * Note: Division will provide 1-copy to ALDOT Stormwater Coordinator in Design Bureau.	2	1*	As Needed	Note: This form, or either ADEM's Non-Compliance form, which is included in packet provided at the time of permit issuance, may be used for notification of stormwater noncompliance reporting.

Form No. & Description	Proj. Eng. to Dist. Eng.	Dist. to Div.	Div. To Const. Bureau	Frequency of Submission	Remarks
DBE-10 Documenting DBE Subcontractor's Earnings	3	2	1*	Monthly	
	Prepared by Contractor and submitted to Project Engineer, * Division submits 1-copy to State DBE coordinator.				
E-18B Property Transfer Report	Performed electronically with receiving party verifying receipt by a hard copy signature. Each party will retain a copy of this receipt for their files.			Following the transfer of each piece of numbered equipment.	Should be completed with each transfer of all numbered equipment.
EEO-100 Compliance Data Report	Prepared by Division EEO or Central Office EEO Personnel. Division will submit the original and 3-copies to the Central Office EEO Coordinator.			As scheduled by Central Office EEO Coordinator.	
FHWA-47 Statement of Materials & Labor on Contract Projects.	4	4	1*	Immediately prior to final acceptance.	Completed by the Contractor prior to final acceptance on Federal Aid Projects with original contract amount of $1,000,000 or more and on the National Highway System. Required on projects involving Federal funds, not required on State Projects.
	* Note: Division submits original to Bureau of Accounting with copies to District and Project Engineer.				
Project Voucher Computer Generated	Project Engineer submits 1-copy of Pre-Printed (Work Copy) of completed Voucher via District Engineer to Division Office, 1-copy to Prime Contractor, and retains 1-copy for Project Files. Note: This form is used to pay Contractor for State, County, or City projects.			Monthly when work performed is $2500 or greater.	Division inputs voucher data and submits electronically to Bureau of Accounts and Finance. Note: Original and 3-copies of Final Estimate is forwarded to State Construction Engineer.
Form 3 Project Voucher Payable	Page two of this form, with original signatures, shall accompany the computer generated version of Final Estimate.			Page Two with Final Estimate.	

Form No. & Description	Proj. Eng. to Dist. Eng.	Dist. to Div.	Div. To Const. Bureau	Frequency of Submission	Remarks
MB 01 Permit Agreement for the Accom. Of Utility Facilities on Highway ROW.	(1) Utility Owner submits 5-copies of Agreement and prints (Original Signatures) to District Engineer. (2) District Engineer reviews, signs and submits 5-copies of Agreement to Division Utilities Eng. (District Engineer sets bond amount).			As Needed	(3) Division Utility Engineer reviews and has Division Engineer sign for approval, then distributes: 2-copies to Utility Owner 1-copy to District Engineer 1-copy to Div. Utility Eng. Permit Files <u>Note:</u> When special situations arise that deviate from normal agreement applications 2-copies of agreement and prints are submitted to Maintenance Bureau for approval.
	<u>Note</u>: **MB 01 Special** Agreement is used on proposed or active Construction Projects. In addition to above the Contractor, Legal Bureau and Maintenance Bureau become involved in the execution of this type agreement.				
MB 02 Special Permit Agreement for Installation of Utilities on Highway ROW.	(1) Private owner submits 5-copies of agreement and prints (Original signature) to District Engineer. (2) District Engineer reviews, signs and submits 5-copies of agreement and prints to Division Utility Engineer (District Engineer sets bond amount). (3) Division Utility Engineer reviews and has Division Engineer sign for approval and submits to 2-copies of agreements and prints to Maintenance Bureau.			As Needed	(4) Maintenance Bureau reviews, signs and returns 1 agreement and print to Division Utility Engineer. (5) Division Utility Engineer distributes 2-copies to private owner 1-copy to District Engineer 1-copy Div Utility Eng. Permit File Note: Permit is for a perpendicular crossing of ALDOT right-of-way - No annual fee required. Bond or Certified Check is required for installation.

Form No. & Description	Proj. Eng. to Dist. Eng.	Dist. to Div.	Div. To Const. Bureau	Frequency of Submission	Remarks
MB 03 Permit Agreement for the Accom. Of Utility Type Facilities on Highway ROW.	(1) Private owner submits 5-copies of agreement and prints (Original signature) to District Engineer. (2) District Engineer reviews, signs and submits 5-copies to Division Utility Engineer (District Engineer sets bond amount). (3) Division Utility Engineer sends 1-print to Division Right-of-Way Engineer to set annual fee amount. (4) Division Utility Engineer reviews-fills in annual fee amount-has Division Engineer sign for approval and submits 2-copies of agreement and prints to Maintenance Bureau.			As Needed	(5) Maintenance Bureau reviews and submits 2-copies of agreement to Legal Bureau For signatures. (6) Maintenance Bureau signs for approval and returns 1-copy of agreement and print to Division Utilities Engineer. (7) Division Utility Engineer forwards-after reviewing annual fee distributes: 2-copies to private owner 1-copy to District Engineer 1-copy to Div. Utility Eng. Permit file Note: Letter sent to private owner on anniversary date for annual fee payment.
OE-2 Supplemental Agreement	1	1	1*	As Needed	Copy must have original signature of the Contractor, Surety, and Division Engineer along with a certified copy (Not a photocopy) of a Power of Attorney when submitted to the Construction Bureau. * 1 full set of support documentation should be submitted with this copy.
OE-7 Request for Permission to Sublet Work.	1	1	1*	As needed	* No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the ALDOT's contracting officer, or his/her authorized representative. **<u>NOTE:</u> The Subcontractor shall not be allowed to proceed with the work until the request for permission to sublet work has been approved and completely executed.**

Form No. & Description	Proj. Eng. to Dist. Eng.	Dist. to Div.	Div. To Const. Bureau	Frequency of Submission	Remarks
OE-IF Change Request	1	1	1*	As needed	Required only on Federal Aid projects to cover major changes in contract quantities, estimated force account work and to accompany Supplemental Agreement. Original signature required. * 1 full set of support documentation should be submitted with this copy.
PR-1391 Fed. Aid Hwy. Construction, Contractor's Annual EEO Report.	4	3	1*	Contractor and Subcontractor submit for Month of July each Year.	Required on Federal Aid projects with original contract amount in excess of $10,000. Must be submitted in July regardless of number of weeks worked during July.
	* Note: Division will submit 2-copies to State EEO Coordinator.				
PR-1392 Summary of Employee Data for all Fed. Aid Highway Projects.	Prepared by Division from Project 1391's. Submit 2 copies to the Central Office EEO Coordinator in August.			Annually	
QC/QA 1 Summary of Initial Test Results					Should be completed each day of Bituminous Plant Mix paving and retained in the Project Files for the duration of the Project. Completed by Project Engineer and used as a worksheet.
QC/QA 2 Summary of Referee Test Results					Should be completed each day of Bituminous Plant Mix paving and retained in the Project Files for the duration of the Project. Completed by Project Engineer and used as a worksheet.

Form No. & Description	Proj. Eng. to Dist. Eng.	Dist. to Div.	Div. To Const. Bureau	Frequency of Submission	Remarks
QC/QA 3 Summary of Adjusted Tonnage	3	2*		As Needed at time of Final Estimate submission.	Should be completed each day of Bituminous Plant Mix paving and retained in the Project Files for the duration of the Project. Completed by Project Engineer.
	* Submit 1-copy to Division Materials Section and 1-copy with Final Estimate Assembly.				
SAHD NO. 1 Non-Reimbursable Agreement	(1) Utility owner submits 5-copies of agreement (Original signature and witness) and prints to Division Utilities Engineer. (2) Division Utilities Engineer reviews and submits 3-copies of agreement and prints to Design Bureau (Attn. State Utilities Engineer). (3) Design reviews and sends to Legal Bureau for "approval as to form" and to Director's office for signature.			As Needed	(4) Design Bureau returns 1-copy of agreement and print to Division Utility Engineer. (5) Division Utility Engineer provides: 1-copy to Utility Owner. 1-copy to District Engineer. 1-copy to Project Engineer. 1-copy to Div. Utility Eng. Proj. file. 1-copy of Authorization Letter to Division Construction Engineer. 1-copy of Authorization Letter to State Utility Engineer.
SAHD NO. 2 Reimbursable Agreement	(1) Utility Owner submits 5-copies of agreement, estimate and prints and Form U-10 (Contract document, Also may use Engineering/Consultant Agreement) to Division Utilities Engineer. (2) Division Utility Engineer reviews and submits 3-copies of agreement, estimate, prints, and Form U-10 to State Utility Engineer. (3) The State Utility Engineer reviews and sends to Legal, Director, Office Engineer (FHWA) and the Governor for approvals.			As Needed	(4) The State Utility Engineer will forward 1-copy of agreement, estimate, and print to Division Utility Engineer. (5) The Division Utility Engineer will provide: 1-copy to District Engineer. 1-copy to Project Engineer. 1-copy to Div. Utility Eng. project file. 1-copy of Authorization Letter to Division Construction Engineer. 1-copy of Authorization Letter to State Utility Engineer. 1-copy of Authorization Letter to Central Office Chief Auditor.

Form No. & Description	Proj. Eng. to Dist. Eng.	Dist. to Div.	Div. To Const. Bureau	Frequency of Submission	Remarks
SAHD NO. 3 Reimbursable Agreement (Work by State)	(1) Utility Owner submits 5-copies of agreement, estimate, and prints to Division Utility Engineer. (2) Division Utility Engineer reviews and submits 3-copies of agreement (Signed by Division Engineer), estimate and prints to State Utility Engineer. (3) The State Utility Engineer reviews and sends to Legal, Transportation Director, Office Engineer (FHWA) and the Governor for approvals. (4) The State Utility Engineer will forward one copy of the agreement, estimate and prints to the Division Utility Engineer			As Needed	(5) Division Utility Engineer will provide: 1-copy to Utility Owner. 1-copy to District Engineer. 1-copy to Project Engineer. 1-copy to Div. Utility Eng. project file. 1-copy of Authorization Letter to Division Construction Engineer. 1-copy of Authorization Letter to State Utility Engineer. 1-copy of Authorization Letter to Chief Auditor.
SAHD NO. 4 Non-Reimbursable Agreement (Work by State)	(1) Utility Owner submits 5-copies of agreement, estimate, and prints to Division Utility Engineer. (2) Division Utility Engineer reviews and submits 3-copies of agreement, estimate, and prints to State Utility Engineer. (3) The State Utility Engineer reviews and sends to Legal, Transportation Director, Office Engineer (FHWA) and the Governor for approvals. (4) The State Utility Engineer will forward one copy of the agreement, estimate and prints to the Division Utility Engineer			As Needed	(5) Division Utility Engineer will provide: 1-copy to Utility Owner. 1-copy to District Engineer. 1-copy to Project Engineer. 1-copy to Div. Utility Eng. project file. 1-copy of Authorization Letter to Division Construction Engineer. 1-copy of Authorization Letter to State Utility Engineer. 1-copy of Authorization Letter to Chief Auditor. <u>Note:</u> Office Engineer sends invoice to Utility Owner following bid results.
SAHD NO. 4 (Revised) Non-Reimbursable Agreement (Work by State)				As Needed	Handled same as above except agreement is unique to certain specified items.

Form No. & Description	Proj. Eng. to Dist. Eng.	Dist. to Div.	Div. To Const. Bureau	Frequency of Submission	Remarks
SAHD NO. 5 Retention Letter	(1) Utility Owner submits Division Utility Engineer 1-copy of agreement and prints. (2) Division Utility Engineer reviews and submits 1-copy to State Utility Engineer.			As Needed	
SAHD NO. 6 Supplemental Agreement (For Utility Relocation)	(1) Utility Owner submits 3-copies of agreement and estimate to Division Utility Engineer. (2) Division Utility Engineer reviews and submits 2-copies of agreement and estimate to State Utility Engineer. (3) The State Utility Engineer reviews and submits to Legal, Transportation Director, Office Engineer (FHWA) and the Governor for approvals. (4) The State Utility Engineer forwards 1-copy of agreement and estimate to Division Utility Engineer.			As Needed	(5) The Division Utility Engineer provides: 1-copy to Utility Owner. 1-copy to District Engineer. 1-copy to Project Engineer. 1-copy to Div. Utility Eng. for proj. file. 1-copy of Letter of Authorization to Division Construction Engineer. 1-copy of Letter of Authorization to State Utility Engineer. 1-copy of Letter of Authorization to Chief Auditor.
SAHD NO. 12 Agreement to Terminate	(1) Utility Owner submits 3-copies of agreement to Division Utility Engineer. (2) Division Utility Engineer reviews and submits 3-copies to State Utility Engineer. (3) The State Utility Engineer reviews and submits to Legal, Transportation Director, Office Engineer (FHWA) and the Governor for approvals.			As Needed	(4) The State Utility Engineer forwards 1-copy to Division Utility Engineer. (5) The Division Utility Engineer provides: 1-copy to Utility Owner. 1-copy to District Engineer. 1-copy to Project Engineer. 1-copy to Div. Utility Eng. for proj. file. 1-copy of Letter of Authorization to Division Construction Engineer. 1-copy of Letter of Authorization to State Utility Engineer. 1-copy of Letter of Authorization to Chief Auditor.

Form No. & Description	Proj. Eng. to Dist. Eng.	Dist. to Div.	Div. To Const. Bureau	Frequency of Submission	Remarks
SJ-114 ALDOT ACCIDENT Report	1 Set	2	2* (**)	As Needed	* Division will submit a copy of SJ-114 along with supporting data to the Legal Bureau with a copy forwarded to the State Equipment Management Coordinator. Submit facsimile copy of all data to Division of Risk Management. Note: If damage equals or exceeds $250 individual is required by law to submit Form SR-13.
	(**) Provide supporting data such as Police Report, Witness Statements, Employee Statement, Risk Management Form, etc.				
SJ-120 A-OE Summary of Time Charges	Note: Division will submit the original and 3-copies to Construction Bureau.			Submitted with Final Estimate.	
SJ-120 Time Statement for Fed. Aid and State Projects	Note: Division will submit the original and 3-copies to Construction Bureau.			Submitted with Final Estimate.	Completed in conjunction with form SJ-120 A-OE.
SP-1 Daily Utility Relocation Report	Project Engineer will submit 2-copies to Division Utility Engineer. Division Utility Engineer reviews and submits 1-copy to State Utility Engineer.			Daily	Project Inspector and Utility Company Representative should agree on materials, labor and equipment each day.
SP-3 Utility Relocation Progress Report	Note: Division will submit 1-copy to Design Bureau Utility Section.			Monthly	Submissions begin after authorization for relocation work by the Division to the Utility owner. Form is submitted whether work is performed or not.
SP-4 Statement of Charges	(1) Utility Owner submits 7-copies with cover letter and invoice to Division Utility Engineer. (2) Division Utility Engineer will send 2-copies to Project Engineer for signature and return to Division Utility Engineer who Retains 1-copy for project file.			As Needed	(3) Division Utility Engineer submits 5-copies to State Utility Engineer. (4) State Utility Engineer reviews and submits to Chief Auditor. (5) Chief Auditor submits to Accounting for Payment.

Form No. & Description	Proj. Eng. to Dist. Eng.	Dist. to Div.	Div. To Const. Bureau	Frequency of Submission	Remarks
Contractor Payroll Errors and Labor (Overtime Wages Involved)	2	2	1*	As Needed	
	* Division will submit 1-copy to State Office Engineer. Division should retain original document.				
Contractor Payroll Errors and Labor (Overtime Wages Not Involved)	2	2	1*	As Needed	
	* Division will submit 1-copy to State Office Engineer. Division should retain original document.				
Detailed Review of Contractor Documentation for Prep. Of Weekly Payroll Transcripts.	2	2	1*	2 Per Project	Only one check required for projects of 6-Months duration or less.
	* Division will submit 1-copy to State Office Engineer. Division should retain original document.				
Notification for Fence Reset in Condemnation Cases	2	1		As Needed	
Structure Release	2	1		As Needed	Release secured by the Contractor from the property owner.
OJT Monthly Training Summary (OJT)	Prepared by Division EEO Officer Submit 1-copy to State EEO Coordinator.			Monthly	Attach copies of individual time reports used to complete summary.
ALDOT Trainee Enrollment/ Time Report (OJT)	Prepared by Division EEO Officer Submit 1-copy to State EEO Coordinator.			Monthly	Individual time reports used by Division to compile summary.

Form No. & Description	Proj. Eng. to Dist. Eng.	Dist. to Div.	Div. To Const. Bureau	Frequency of Submission	Remarks
EEO and Labor Compliance (Individual Employee Interview)	1	1		Minimum of one per Month per 15 employees. One per Month if less than 15 employees.	Project personnel will complete as they interview contractor's employee. The number of interviews will vary with the number of contractor employees.
Certification Of Actual Payments to DBE Firms	Prepared by Contractor and each Subcontractor DBE. Reviewed by Division Engineer. Submit two copies to State DBE Coordinator.			At completion of work.	
Engineer's Monthly Inventory of Equipment (Engineering Equipment Only.	2	1		Monthly	
Project Traffic Control Inspector's Accident Report	3	2	1*	Following each accident related to problem with TCP, Project Activity or involving a fatality.	State Traffic Engineer will evaluate and furnish recommendations or proposed improvements to State Construction Engineer and Design Personnel having responsibility for the design and preparation of TCP's..
	* Division will submit Accident Report and supporting data to State Traffic Engineer. <u>Note</u>: See Subarticle 107.14(c)				

Form AL 100 (All Projects) — OE
Rev. 5-1-81

STATEMENT OF WAGE COMPLIANCE

Project No. _____ County _____ Date _____

I, _____ (Name of signatory party), _____ (Title) do hereby state:

(1) That I pay or supervise the payment of the persons employed by _____ (Contractor or subcontractor) on the _____ (Building or work); that during the payroll period commencing on the _____ day of _____, 19 __ and ending the _____ day of _____, 19 __, all persons employed on said project have been paid the full weekly wages earned, that no rebates have been or will be made either directly or indirectly to or on behalf of said _____ (Contractor or subcontractor) from the full weekly wages earned by any person and that no deductions have been made either directly or indirectly from the full wages earned by any person, other than permissible deductions as defined in Regulations, Part 3 (29 CFR Subtitle A), issued by the Secretary of Labor under the Copeland Act, as amended (48 Stat. 948.63 Stat. 108, 72 Stat. 967; 76 Stat. 357; 40 U. S. C. 276c), and described below:

_____

_____

_____

_____

(2) That any payrolls otherwise under this contract required to be submitted for the above period are correct and complete; that the wage rates for laborers or mechanics contained therein are not less than the applicable wage rates contained in any wage determination incorporated into the contract; that the classifications set forth therein for each laborer or mechanic conform with the work he performed.

(3) That any apprentices employed in the above period are duly registered in a bona fide apprenticeship program registered with a State apprenticeship agency recognized by the Bureau of Apprenticeship and Training, United State Department of Labor, or if no such recognized agency exists in a State, are registered with the Bureau of Apprenticeship and Training, United States Department of Labor.

(4) That:

(a) WHERE FRINGE BENEFITS ARE PAID TO APPROVED PLANS, FUNDS, OR PROGRAMS

☐ - In addition to the basic hourly wage rates paid to each laborer or mechanic listed in the above referenced payroll, payments of fringe benefits as listed in the contract have been or will be made to appropriate programs for the benefit of such employees, except as noted in Section 4(c) below.

(b) WHERE FRINGE BENEFITS ARE PAID IN CASH

☐ - Each Laborer or mechanic listed in the above referenced payroll has been paid as indicated on the payroll, an amount not less than the sum of the applicable basic hourly wage rate plus the amount of the required fringe benefits as listed in the contract, except as noted in section 4(c) below.

(c) EXCEPTIONS

EXCEPTION (CRAFT)	EXPLANATION

REMARKS

NAME AND TITLE	SIGNATURE

THE WILFUL FALSIFICATION OF ANY OF THE ABOVE STATEMENTS MAY SUBJECT THE CONTRACTOR OR SUBCONTRACTOR TO CIVIL OR CRIMINAL PROSECUTION. SEE SECTION 1001 OF TITLE 18 AND SECTION 231 OF TITLE 31 OF THE UNITED STATES CODE.

Form AL 150 - OE
Rev. 5-1-81

STATEMENT REQUIRED ON ALL PROJECTS
IN THE STATE OF ALABAMA

Date _____

Project No. _____ County _____

I, _____, _____
(Name of Signatory Party) (Title)

do hereby state: that I am employed by _____
(Name of Prime Contractor)

who is the Prime Contractor on above numbered project: that I am familiar and keep check on labor forces of contractor and his subcontractors; that I am listing below the name of prime contractor and his subcontractors with an indication opposite the name of each as to whether he was "Active" or "Inactive" on the project during week ending _____.

Name of Contractor and Subcontractors	(Indicate by Check Mark) Active	Inactive

I further state that the subcontractors listed above as "Active" were the only subcontractors working under this contract during the week indicated and that labor reports, etc. as required by the Labor Provisions in contract are attached and submitted herewith.

(Signed) _____

Title _____

In my opinion this statement is correct.

(Signed) _____
(Project Engineer)
State of Alabama Highway Department

Form BC-101

INSPECTOR'S DAILY REPORT

Project No. _____ Day & Date _____
Weather _____ Temperature: High _____ Low _____
Work Day _____ Time Work Started _____ Stopped _____ Hours Worked _____
Contractor's Forces: Supt. _____ Foreman _____
Operators _____ Laborers: Skilled _____ Unskilled _____ Others _____

Engineering Personnel: _____

Contractor's Equipment On Project

Number & Type	Operating	Not Oper.	Reason Not Operating

DETAILS OF DAILY OPERATIONS

_____
Inspector

Visitors: _____

Day & Date ..... Days charged ..... Days charged to date .....

Reason for not charging working day if none charged: .....

Contractor's Personnel: .....

.....

.....

Equipment

Type Equipment	Number	Operating	Not Operating	Why Not Operating

Field Engineering Personnel

Progress: Satisfactory Unsatisfactory If unsatisfactory, give reasons

Visitors:

Weather ..... Temperature High ..... Low .....

Time Work Started ..... Stopped ..... Hours Worked .....

DETAIL OF DAILY OPERATIONS (See paragraph 11)

DAILY OPERATIONS CONTINUED

DAILY OPERATIONS CONTINUED

CONCRETE, AGGREGATE BASE AND PAVEMENT PLACED

Station to Station	Material	Unit	Current	Previous	Total

To Be Initialed Daily Upon Review by Project Engineer

BM - 103
4/12/48

STATE OF ALABAMA HIGHWAY DEPARTMENT
BUREAU OF MAINTENANCE
REPORT OF PERSONNEL

DIVISION _____ LOCATION _____

DISTRICT _____ PERIOD ENDING _____

TRUCK DRIVERS _____ RATE _____ DAY LABOR _____ RATE _____ PRISONERS _____

TRUCK DRIVERS _____ RATE _____ DAY LABOR _____ RATE _____

TRUCK DRIVERS _____ RATE _____ DAY LABOR _____ RATE _____

LIST OF CLASSIFIED PERSONNEL AND DUTIES

NAME	CLASSIFICATION	SALARY	DUTIES BEING PERFORMED

SIGNED _____

Form BMT-4 currently under revision.
Not available at time of posting.

Form BMT-6 currently under revision.
Not available at time of posting.

Form BMT-21 currently under revision.
Not available at time of posting.

BMT-23

2-13-59
REVISED 7-14-76

STATE of ALABAMA
HIGHWAY DEPARTMENT
Bureau of Materials and Tests

Geotechnical Section

Settlement Plate Measurement

PROJECT No. _____ SETTLEMENT PLATE No. _____

COUNTY _____ LOCATION _____

DIVISION _____ DATE SET _____

LAST REPORT

PLATE ELEVATION _____ DATE OF MEASUREMENT _____

THIS REPORT

PLATE ELEVATION _____ DATE OF MEASUREMENT _____

CHANGE IN ELEVATION (ΔE) _____ TIME INTERVAL (ΔT) _____

RATE OF SETTLEMENT (FEET PER DAY) $\frac{\Delta E}{\Delta T}$ _____

ERROR OF CLOSURE OF LEVEL LOOP _____ LEVELMAN _____

ELEVATION OF COMPLETED SURCHARGE (AT THIS PLATE) _____

ELEVATION OF FINISHED GRADE (AT THIS PLATE) _____

ELEVATION OF FILL AT TIME OF MEASUREMENT _____

TOTAL ACCUMULATED SETTLEMENT TO DATE _____

REMARKS: _____

_____

_____

_____

_____

DATE _____ PROJECT ENGINEER _____

Bit. Engr. _____
Div. Engr. _____
Res. Engr. _____
Proj. Engr. _____

ALABAMA HIGHWAY DEPARTMENT

BITUMINOUS DISTRIBUTOR DAILY REPORT FORM

Report No. _____

(Final) (Continuous) _____ **Dated** _____, 19 ___

Proj. No. _____
County _____
Dist. No. _____ Div. No. _____
Proj. Length _____ Miles
Sta. _____
To Sta. _____

Form BMT-36 (Rev. 1/86)

Location of Project _____

Contractor _____ Type of work being done _____

Weather today: _____ Temperature today: _____ °F Low _____ °F High _____ °F Aver.

MATERIAL	PRIME	HOT APPLICATION	CUT BACK OR EMULSION	COARSE AGGREGATE	FINE AGGREGRATE
Kind and Grade					
Producer					
Plant Shipped from					

Station	To Station	No. of Sq. Yds.	BITUMEN USED				AGGREGATE USED		Kind of Work
			Gross	Temp F° Applied	Gal. Equivalent at 60°	Rate Per Sq. Yd.	Cu. Yds. Used	Cu. Ft. Per Sq. Yd.	
WORK DONE THIS DATE									
WORK DONE TO DATE									
									Prime

Remarks: _____

_____ Inspector. _____ Proj. Eng.

NOTE: In Kind of Work Column record on each line whether work involved is priming, placing aggregate, hot application, tack coat, etc. Send copies of this report to Division Office for each day's work. Under Work Done to Date, show totals to date for each stage of the work, use first line for the prime, second line for coarse aggregate, etc.
Under Remarks state width of application; record any notes of interest.

Form BMT-38 currently under revision.
Not available at time of posting.

Form BMT-55 currently under revision.
Not available at time of posting.

Form BMT-57 currently under revision.
Not available at time of posting.

Form BMT-60 currently under revision.
Not available at time of posting.

Form BMT-65 currently under revision.
Not available at time of posting.

Form BMT-66 currently under revision.
Not available at time of posting.

Form BMT-73 currently under revision.
Not available at time of posting.

BMT-78

STATE OF ALABAMA HIGHWAY DEPARTMENT

RATE OF SPREAD AND PULVERIZATION OF LIME STABILIZED SOIL

PROJECT _____ DIVISION _____

COUNTY _____ DATE _____

Length of Spread Col. "f"	(a) Lime Truck Number	(b) Sample Number	(c) Total Weight of Lime (Lbs.)	(d) Width of Spread	Original P. D.	% Lime Req'd.	(e) Lbs. Lime per Lin. Ft. of R/W (from Chart BMT-79)	(f) Length of Spread (Ft.) $\frac{c}{e} = f$	(g) S. Y. Spread $g = \frac{dxf}{9}$	PULVERIZATION DATA: Total Wt. of Sample	Sieves Required	Weight Retained	Percent Passing	% Moisture
Sta. to Sta.											3" 2" #4			
Sta. to Sta.											3" 2" #4			
Sta. to Sta.											3" 2" #4			
Sta. to Sta.											3" 2" #4			
Sta. to Sta.											3" 2" #4			
Sta. to Sta.											3" 2" #4			

PROJECT ENGINEER

BMT 79

ALABAMA HIGHWAY DEPARTMENT
CHART FOR CALCULATING
POUNDS LIME REQUIRED PER LINEAR FOOT ROADWAY

WIDTH OF TREATED LAYER (FT.)	STANDARD DENSITIES - AASHO T-99										
	90	92	94	96	98	100	102	104	106	108	110
30	13.50	13.80	14.10	14.40	14.70	15.00	15.30	15.60	15.90	16.20	16.50
32	14.40	14.72	15.04	15.36	15.68	16.00	16.32	16.64	16.96	17.28	17.60
34	15.30	15.64	15.98	16.32	16.66	17.00	17.34	17.68	18.02	18.36	18.70
36	16.20	16.56	16.92	17.28	17.64	18.00	18.36	18.72	19.08	19.44	19.80
38	17.10	17.48	17.86	18.24	18.62	19.00	19.38	19.76	20.14	20.52	20.90
40	18.00	18.40	18.80	19.20	19.60	20.00	20.40	20.80	21.20	21.60	22.00
42	18.90	19.32	19.74	20.16	20.58	21.00	21.42	21.84	22.26	22.68	23.10
44	19.80	20.24	20.68	21.12	21.56	22.00	22.44	22.88	23.32	23.76	24.20
46	20.70	21.16	21.62	22.08	22.54	23.00	23.46	23.92	24.38	24.84	25.30
48	21.60	22.08	22.56	23.04	23.52	24.00	24.48	24.96	25.44	25.92	26.40
50	22.50	23.00	23.50	24.00	24.50	25.00	25.50	26.00	26.50	27.00	27.50
52	23.40	23.92	24.44	24.96	25.48	26.00	26.52	27.04	27.56	28.08	28.60
54	24.30	24.84	25.38	25.92	26.46	27.00	27.54	28.08	28.62	29.16	29.70
56	25.20	25.76	26.32	26.88	27.44	28.00	28.56	29.12	29.68	30.24	30.80
58	26.10	26.68	27.26	27.84	28.42	29.00	29.58	30.16	30.74	31.32	31.90
60	27.00	27.60	28.20	28.80	29.40	30.00	30.60	31.20	31.80	32.40	33.00
62	27.90	28.52	29.14	29.76	30.38	31.00	31.62	32.24	32.86	33.48	34.10
64	28.80	29.44	30.08	30.72	31.36	32.00	32.64	33.28	33.92	34.46	35.20
66	29.70	30.36	31.02	31.68	32.34	33.00	33.66	34.32	34.98	35.64	36.30
68	30.60	31.28	31.96	32.64	33.32	34.00	34.68	35.36	36.04	36.72	37.40
70	31.50	32.20	32.90	33.60	34.30	35.00	35.70	36.40	37.10	37.80	38.50

NOTE: The above chart is based on 1% lime, 6" thickness and 1' of roadway length. Intermediate values may be found by interpolation. To find

Form BMT-83 currently under revision.
Not available at time of posting.

Form BMT-90 currently under revision.
Not available at time of posting.

Form BMT-92 currently under revision.
Not available at time of posting.

Form BMT-97 currently under revision.
Not available at time of posting.

Form BMT-112 currently under revision.
Not available at time of posting.

Form BMT-113 currently under revision.
Not available at time of posting.

Form BMT-117 currently under revision.
Not available at time of posting.

BMT-C-7-C
4/14/94

ALABAMA DEPARTMENT OF TRANSPORTATION

1. Div. _____ Dist. _____ County _____ Sect No: Proj No: _____
2. Contractor _____
3. Material _____ Pit Location or No. _____
4. Truck No. _____ m^3 Per Load _____ Total m^3 _____
5. Station _____ to Station _____
6. Inspector _____ Date _____

7. NUMBER OF LOADS HAULED																TOTALS
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	

Form C-10

Sheet _____ of _____

PROGRESS SCHEDULE OF OPERATIONS

Project _____

County _____

Contract Time _____ ( )working days ( )Calendar Days ( )Calendar date

Directions for Completion

1. List each major work phase.
2. Cross-hatch bar during months of operation for each phase.
3. Indicate beginning and completion dates above each bar for each phase.
4. Submit six (6) copies to the division engineer prior to the Pre-Construction Conference.

Begin Work Date _____

WORK PHASE	MONTHS OF OPERATION																																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36

PROJECT NO.	COUNTY	DIVISION
LOCATION		
TYPE OF WORK		LENGTH
CONTRACTOR & ADDRESS		
SURETY AGENT & ADDRESS		

CONTRACT AMOUNT	LET	AWARDED	APPROVED	WORK ORDER	WORK BEGAN

MAINT. LETTER	FINAL ACCEPTANCE	FINAL ESTIMATE	FINAL CONTRACT AMOUNT

CONSTRUCTION TIME CONTRACT	ACTUAL	TIME EXTENSION	ACCOUNT NUMBER

FORM C-13C

Go to Editable Form C-14 (english)

Go to Editable Form C-14 (metric)

FORM C-14 **ALABAMA DEPARTMENT OF TRANSPORTATION**

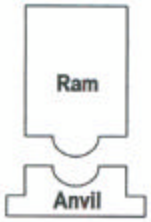
Revised 08-07-95 PILE AND DRIVING EQUIPMENT DATA FORM

Project Number	County	Division

Pile Driving Contractor or Subcontractor	Bridge Identification Number

Details of access method to pile top for dynamic testing are: ❑ Attached ❑ Not Applicable

Hammer Components



Hammer

Manufacturer: _____ Model: _____

Type: _____ Serial No.: _____

Rated Energy: _____ (ft.-lbs.) at _____ (ft.) Length of Stroke

Modifications: _____

Capblock (Hammer Cushion)

Material: _____

Thickness: _____ (in.) Area: _____ (in.²)

Modulus of Elasticity - E : _____ (P.S.I.)

Coefficient of Restitution - e : _____

Pile Cap

Helmet
Bonnet
Anvil Block
Drivehead

Weight : _____ (lbs.)

Note: Should include weight of striker plate.

Pile Cushion

Cushion Material: _____

Thickness: _____ (in.) Area: _____ (in.²)

Modulus of Elasticity - E : _____ (P.S.I.)

Coefficient of Restitution - e : _____

Pile

Pile Type: _____

Length (in Leads): _____ (ft.)

Weight / Ft: _____ (lbs./ft.)

Wall Thickness: _____ (in.) Taper: _____

Cross Sectional Area: _____ (in²)

Design Pile Capacity: _____ (Tons)

Description of Splice: _____

Tip Treatment Description: _____

Note: If mandrel is used to drive this pile, attach separate manufacturer's detail sheet(s) including weight and dimensions.

Submitted By:_____ Date:_____

Go to Editable Form C-15A (english)

Go to Editable Form C-15A (metric)

FORM C-15A
Revised 08-07-95

ALABAMA DEPARTMENT OF TRANSPORTATION
TEST PILE RECORD

Project Number		County	Division
Bridge Station	To Station	Bridge Identification Number	
Road Between		and	
Contractor		Inspector	
Date	Bent No. & Lane	Pile No.	Kind of Soil
Kind of Pile	Size of Pile	Total Length (ft.)	
Elev. Ground Line at Pile	Final Elev. at Top of Pile	Tip Elevation	
Hammer Make	Hammer Model	Hammer Kind	
Hammer Type	Hammer Action	Rated Energy (ft.-lbs.)	
Weight of Hammer (lbs.)		Design Load (from plans) (tons)	
Hammer Cushion: Material	Thickness (in.)	Area (sq. in.)	
Pile Cushion (Before Driving): Material	Thickness (in.)	Area (sq. in.)	
Pile Cushion (After Driving): Material	Thickness (in.)	Area (sq. in.)	
Pile Cap Weight (lbs.)			

Height Of Fall (feet)	Energy Delivered To Pile (E) (ft.-lbs.)	Blows Per Foot Of Penetration (N)	Total Penetration (feet)	Bearing (Ru) (tons)

REMARKS

1. When using open type and gravity hammers, record weight of hammer and height of fall of hammer. Show rated energy when using closed type hammers.
2. Energy delivered to pile should be maintained practically constant once record keeping has begun unless specified otherwise by the Engineer.
3. Pile cushion is only required with concrete piling.
4. Pile cushion thickness after driving must be at least one-half the original thickness.
5. The bearing should be determined from the graph of Blows/Foot versus Bearing which is provided from the Wave Equation Analysis or Dynamic Formula of the driving system. If a graph is not provided, refer to Item 505.03(b)2. of the specifications to estimate the bearing capacity using the Dynamic Formula.
6. Driving should be continuous. Note any interruptions exceeding one hour.
7. Draw sketch on back of this sheet showing location of test pile.
8. For continuation of test pile record, use Form C-15C-2.
9. Test pile (check one): Static Load Tested ____ Dynamic Load Tested ____ (if static load tested, load test report shall be attached to this report).

Correct_____ Approved_____

Project Engineer Division Engineer

Sheet No. 1 of ___

Go to Editable Form C-15A-2 (english)

Go to Editable Form C-15A-2 (metric)

FORM C-15A-2 **ALABAMA DEPARTMENT OF TRANSPORTATION**

Revised 08-07-95 CONTINUATION OF TEST PILE RECORD

Project Number		County	Division
Bridge Station	To Station	Bridge Identification Number	
Date	Bent No. & Lane	Pile No.	Kind of Soil

Height Of Fall (feet)	Energy Delivered To Pile (E) (ft.-lbs.)	Blows Per Foot Of Penetration (N)	Total Penetration (feet)	Bearing (Ru) (tons)

Sheet No. ___ of ___

Go to Editable Form C-15B (english)

Go to Editable Form C-15B (metric)

FORM C-15B **ALABAMA DEPARTMENT OF TRANSPORTATION**

Revised 07-15-94 PILE LOADING RECORD - QUICK LOAD TEST

Project Number	County	Division
Station, Bent No. & Lane	Bridge Identification Number	
Contractor	Inspector	
Date	Pile Number	Length of Pile (Feet)
Size and Type of Pile	Calculated Elastic Modulus of Pile (E) (ksi)	Measured Elastic Modulus of Pile (E) (ksi)
Dist. From Settlement Gage To Pile Tip(Feet)	Elevation of Ground Line at Pile	Pile Tip Elevation
Design Load (Tons)	Maximum Applied Load (Tons)	Ultimate Capacity (Qr) (Tons)

Elapsed Time (Minutes : Seconds)	Increment Of Load (Tons)	Total Accumulated Load (Tons)	Settlement Before Loading Increment (Inches)	Settlement After Loading Increment (Inches)
:				
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Pile Loading Record Continued On Sheet No. 2 of 2

Sheet No. 1 of 2

Go to Editable Form C-15B (english)

Go to Editable Form C-15B (metric)

FORM C-15B-2 **ALABAMA DEPARTMENT OF TRANSPORTATION**

Revised 07-15-94 PILE LOADING RECORD - QUICK LOAD TEST (CONT.)

Project Number	County	Division
Station, Bent No. & Lane	Bridge Identification Number	
Date	Pile Number	Length of Pile (Feet)

Elapsed Time (Minutes : Seconds)	Increment Of Load (Tons)	Total Accumulated Load (Tons)	Settlement Before Loading Increment (Inches)	Settlement After Loading Increment (Inches)
Pile Loading Record Continued From Sheet No. 1 of 2				
:				
:				
:				
:				
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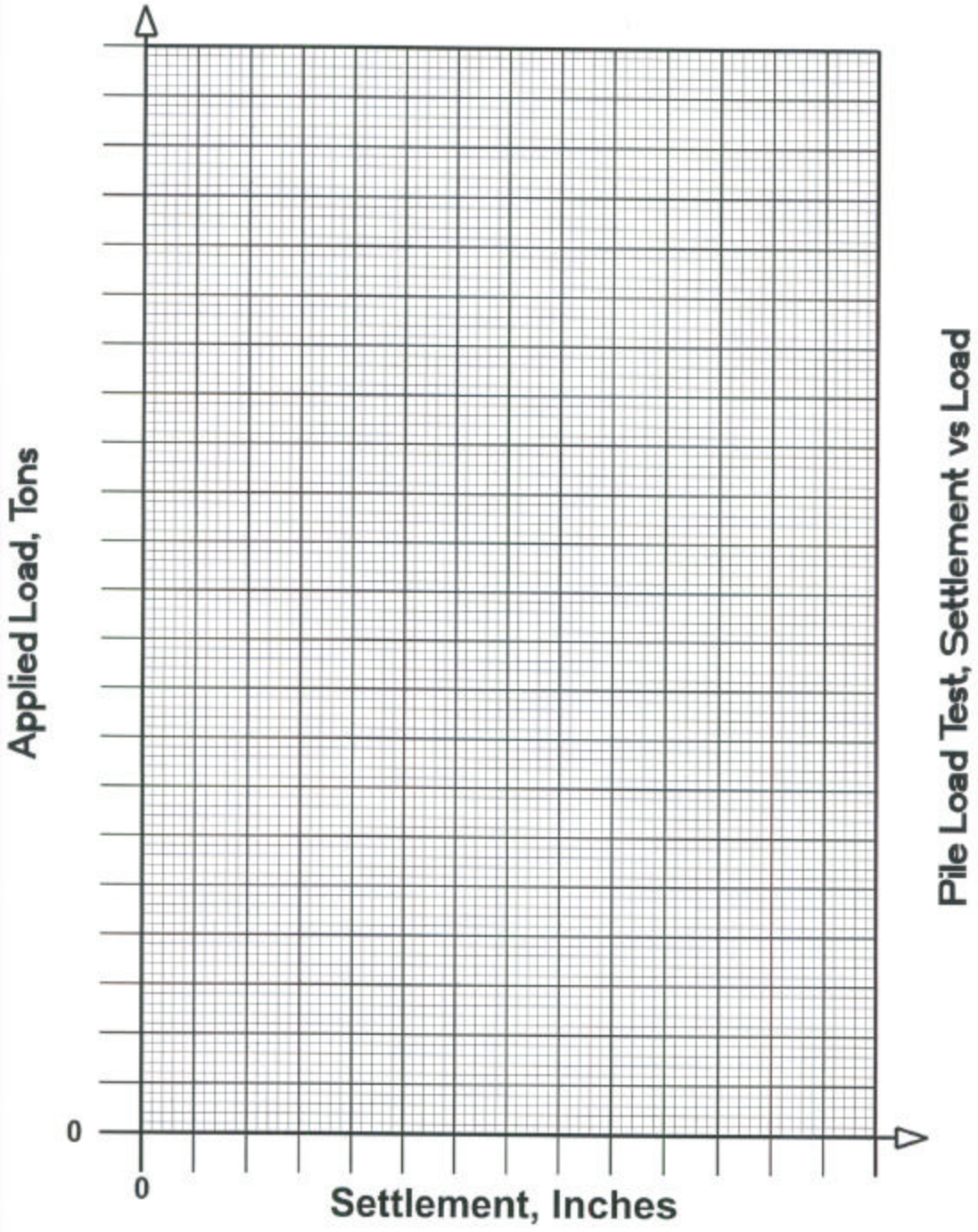
:				

☐ Check Here For A Passing Load Test ☐ Check Here For A Failing Load Test

Submitted By: (Project Engineer)

Submitted By: (Division Engineer)

Sheet No. 2 of 2


Pile Load Test, Settlement vs Load
Applied Load, Tons
0
0
Settlement, Inches

Go to Editable Form C-15C

FORM C-15C **ALABAMA DEPARTMENT OF TRANSPORTATION**

Revised 07-15-94 PROPOSED PILE LENGTHS

TEST PILE DATA
TO BE COMPLETED BY PROJECT ENGINEER

Project Number		County	Division
Bridge Station	To Station	Bridge Identification Number	
Road Between		and	
Contractor		Inspector	
Date	Bent No. & Lane	Pile No.	Kind of Soil
Kind of Pile	Size of Pile	Length in Structure	
Cut Off Elevation at Top of Pile		Tip Elevation	

FURNISHED PILE LENGTHS
TO BE COMPLETED BY CONTRACTOR'S REPRESENTATIVE

Based on data of the test pile driven in above bent, it is proposed to furnish pile lengths for bents as listed below:

BENT NUMBER	FOOTING	PILE NUMBER	PROPOSED LENGTHS

Date: _____ Signed: _____
Contractor's Representative

The above proposed pile lengths have been reviewed by me and in my opinion are sufficient for proposed lengths based on the test pile driven at the above location. Actual lengths of individual piles will be determined by the Engineer or Inspector during driving operations.

Date: _____ Signed: _____
Project Engineer

Signed: _____
Division Construction Engineer

cc: Contractor
Division Office
District Office
Project Office

Signed: _____
ALDOT Geotechnical Engineer
(For Concrete Piles Only)

Go to Updated Editable Form C-16C

Go to Updated Editable Form C-16S

FORM C-16
Revised 08-07-95

ALABAMA DEPARTMENT OF TRANSPORTATION
DRIVING RECORD OF PILING

Project Number	County	Division
Bridge: Station to Station		Bridge Identification Number
Road Between and		Lane (if applicable)
Contractor	Sub-Contractor	Inspector
Kind of Piling	Size of Piling	
Hammer Make	Hammer Model	Hammer Kind
Hammer Type	Hammer Action	Design Load (from plans)

Date	Bent No.	Pile No.	Proposed Length (feet)	Furn. Length (feet)	Added Pile (feet)	Pile Heat No.	Actual Length Cutoff (feet)	Actual Length in Str. (feet)	Total Splices	Height of Fall (feet)	Energy Delivered (ft.-lbs.)	Blows per Ft. of Penet.	Tip Elev.	Bearing (tons)
TOTALS:														

REMARKS

1. Bents numbered as per plans. In general, piles numbered from left to right.
2. Draw sketches on back showing numbering sequence of piles in abutments, trestle bents, and bent footings. Also show any changes in plans on back.

Correct_____
Project Engineer

Approved_____
Division Engineer

Form C-17C
Revised 9/2000

STATE OF ALABAMA DEPARTMENT OF TRANSPORTATION
BUREAU OF _____

MATERIAL PIT RELEASE

STATE OF ALABAMA
COUNTY OF _____

RE: Project _____
County of _____

I, (We), _____ hereby certify to the following in connection with the removal of _____ from material pit(s) located on my (our) land in the _____ County, Alabama, and used on the above numbered project.

1. That I (we) have received payment in full from _____ _____, Contractor on the project, for _____ cubic yards of _____ @ _____ per cubic yard.

2. That the material pit(s) has (have) been satisfactorily cleared of all debris, properly drained and surplus material leveled.

3. That I (we) hereby release _____ _____, the Contractor; the Alabama Department of Transportation; and _____ County from all liability of any nature, either present or consequential in connection with the removal of _____ from my (our) property.

IN WITNESS whereof I (we) have hereunto set my (our) hand and seal this the _____ day of _____, 20 _____.

WITNESSES:

_____ _____
OWNER

_____ _____

_____ _____

Copy to:
County Transportation Engineer
Construction Engineer
Division Engineer
County Engineer

ALABAMA DEPARTMENT OF TRANSPORTATION

CONSTRUCTION INSPECTION REPORT

C-18-C
REV. 9/2000

Federal Aid County Projects

Division No.: _____ Project No.: _____ County: _____

Project Location: _____

Type and Length of Project: _____

Report No.: _____ Made by: _____ Date: _____

1. Status of Project:

(a) Quality of Work _____
(b) Is progress satisfactory? _____
(c) Have materials used been tested and found satisfactory? _____
(d) Have unsatisfactory features noted previously been corrected? _____
(e) Percentage of time elapsed _____
(f) Percent completed on date of inspection _____
(g) Estimated percentage of completion at end of month _____

2. Work Done to Date:

3. Work in Progress:

4. Comments and Recommendations:

Signed: _____

_____
TITLE

FORM C-19C
Revised 9/2000

Go to Updated Editable Form C-19A

TIME EXTENSION REQUESTED

Project No. _____ County _____

Contractor _____

Time Statement at Close of Period Covered by this Report

Days in contract _____ (Calendar, Working Days)
Extension previously approved _____ (Calendar, Working Days)
Total days allowed _____ (Calendar, Working Days)
Number days used _____ (Calendar, Working Days)
Percent days used _____
Percent project complete _____

Time Extension Request by Contractor During Period from _____ to _____

Reason No.	Reason	No. Days Requested by Contractor	Number Days Recommended by Division

Recommendation of Division Engineer _____ (Calendar, Working Days)

For Reason Number(s) _____

_____
(Division Engineer)

Recommended for _____ days

_____ Date _____
Construction Engineer
Alabama Department of Transportation

_____ Date _____
Transportation Engineer,
Federal Highway Administration

_____ Date _____
Operations and Pavements Engineer,
Federal Highway Administration

Go to Updated Editable Form C-20

Form C-20
Rev. 8-91

Alabama Department of Transportation

Date: _____ DIVISION _____ DISTRICT _____

TO: _____ Re: Project _____
_____ County _____
_____

Gentlemen:

The time charged on the above referenced Project for Estimate Period Ending _____ 19____ is as follows:

Date Day	Time Charged	Remarks	Date Day	Time Charges	Remarks

TO DATE STATUS	
Days in Contract _____	% Grading Complete _____
Extensions Approved _____	% Drainage Structures Complete _____
Days Allowed _____	% Base Complete _____
Days Used _____	% Paving Complete _____
Days Lost _____	% Bridges Complete _____
% Time Elapsed _____	% _____
% Project Complete _____	% _____
Est. Date of Completion _____	% _____

Notes: 1. The original copy of this report shall be mailed to the contractor's home office and a copy shall be given the contractor's project superintendent.
2. Any objections to the above charges should be filed as outlined in Subarticle 108.08(d).

Yours very truly,

cc: Division Office (4)
District Office (1)
Project Office (1)

_____
Project Engineer

Form C-21

Partial Payment of Stored Materials

Inspection For: Project_____
County_____
Division_____

A. Inspection of Storage Area and Materials Stored
(1) Date of Inspection_____.
(2) Location of Storage Area _____
_____

(3) Description of Stored Materials_____
_____
_____

(4) Is Storage Area proper for the type materials being stored? Yes____No____.
Remarks_____.

(5) Are materials properly stored and separated for this project? Yes___No___.

(6) List Invoice or Order Numbers covering these materials._____
List any materials shown on invoice or order numbers but not on-hand
_____.

(7) List any data which you might have to document that these materials conform to requirements of plans and specifications. _____
_____. (Primarily applies to materials inspected by State Inspector during fabrication.)

Inspected By_____

Title_____

B. Documentation (To Be Completed by Project Personnel)
(1) Contract Item for which materials are stored_____.

(2) Written request by the Contractor
Yes____ No____ Date of Written Request_____.

(3) Invoice or Order Numbers_____

(4) Dollar Amount of Invoices (Less any Discounts to Contractor)_____
(Must exceed $2500.00)

(5) 75% of contract item = $_____.

(6) Payment amount to be No. 4_____ or No. 5_____(lesser amount)

(7) Test reports on-hand to cover all materials? Yes____ No____. If No, does other data or information available to you, document that these materials conform to the requirements of the plans and specifications? Yes___No___.
List same _____.

C. Payment Approval
After reviewing the above information, I (do) (do not) approve partial payment for the stored materials covered by this document. Payment to be included on Estimate No. _____.

_____
Project Engineer

(Continued on Back)

D. Continuing Documentation (To be completed by Project personnel)

(1) Date of receipt of certified invoice _____.

(2) Proper certification statement as per Article 109.07 (Partial Payment)? Yes____ No____.

(3) Partial Payment to be (withdrawn) (continued). If withdrawn, Estimate No. _____.

Notes

(1) Written Request by the Contractor for partial payment is required each time invoices are submitted for each eligible pay item of which the materials are a part.

(2) Form C-21 must be completed for each set of invoices for each eligible pay item.

C-22-C

Alabama Department of Transportation

SOURCE VALIDATION TICKET

Sect. No. _____

1. Div. _____ Dist. _____ County _____ Proj. No. _____
2. Contractor _____
3. Material _____ Source (Pit) _____
4. Truck No. _____ Cu. Yds. Per Load _____
5. Inspector _____ Date _____

6. NUMBER OF LOADS HAULED															TOT.	SIGNATURE
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		

DATE ISSUED:	*REVISION:* *JULY 1, 1985*

Form C-23

Go to Editable Form C-23

Alabama Department of Transportation

Affidavit for Payment of Debts Incurred on Construction Projects

Project No. _____

County _____

Contractor _____

Description and Location of Project _____

_____

This is to certify that all known debts for labor and materials used on the project and all approved sub-contractual obligations associated with the construction of Project _____, _____ County, have been paid or will be paid within 5 days after final payment.

Sworn to me this the _____ day of _____, _____.
(month) (year)

_____
(Name)

_____
(Title)

_____
(Contractor)

Sworn to and subscribed before me the _____ day of _____, _____.
(month) (year)

_____
(Notary Public)

For _____ County _____ State

My commission expires _____
(date)

Form C-24
Rev. 9/2000

ALABAMA DEPARTMENT OF TRANSPORTATION

Daily Report of Railway Inspection
and/or Flagging

Date: _____

Project: _____

County: _____

Inspection by Railway

Name of Inspector _____

Residence _____

_____

Base Location _____

_____

Explanation of need for Railway Inspector _____

_____

_____

Time of Inspection: Begin _____ End _____ Total hours _____

Flagging by Railway

Name of Flagman _____

Residence _____

_____

Base Location _____

_____

Time of Flagging Service: Begin _____ End _____ Total hours _____

Name of Flagman _____

Residence _____

_____

Base Location _____

_____

Time of Flagging Service: Begin _____ End _____ Total hours _____

-2-

Reason for need of flagging service (ALDOT Reimbursement)

( ) working within specified track cleanance

( ) working over tracks

( ) work likely to disturb surface and alignment of tracks

( ) other work within Railway R.O.W.

( ) other _____

_____

*Reason for need of flagging service (Contractor reimbursement)

( ) transportating materials and/or equipment across temporary grade crossing.

( ) other _____

_____

Description of Contractor's operations within vicinity of railway:

_____

_____

_____

Signatures:

_____
ALDOT Representative

_____
Railway Inspector

_____
Railway Flagger(s)

_____
*Contractor Superintendent

*Required only if reimbursement must be made by the Contractor to the Railway Company.

Go to Updated Editable Form C-25

Form C-25 Rev. 9/93

ALABAMA DEPARTMENT OF TRANSPORTATION
DAILY INSPECTION REPORT OF TRAFFIC CONTROL DEVICES

Project No. _____ Sheet ___ of ___

County _____

Contractor _____ Week Ending (Sat.) _____

Traffic Control Device	Location	Weather Time of Inspection Day of Week	MON.	TUE.	WED.	THUR.	FRI.	SAT.
		Condition Remarks						
		Condition Remarks						
		Condition Remarks						
		Condition Remarks						
		Condition Remarks						
		Condition Remarks						
		Condition Remarks						

Note: Check mark (✓) in condition denotes device conforms to AMUTCD. "X" denotes device does not conform.

Note: Remarks must be completed for "X" condition to note type deficiency (Bent, sheeting damaged, flasher not working, leaning, etc.). Dates of correction must also be noted.

Traffic Control Inspector _____ Reviewed _____ Project Engineer

Go to Updated Editable Form C-25-2

Form C-25-2

Week Ending (Sat.) _____ Sheet ____ of ____

Traffic Control Device	Location	Weather Time of Inspection Day of Week	MON.	TUE.	WED.	THUR.	FRI.	SAT.
		Condition Remarks						
		Condition Remarks						
		Condition Remarks						
		Condition Remarks						
		Condition Remarks						
		Condition Remarks						
		Condition Remarks						
		Condition Remarks						
		Condition Remarks						
		Condition Remarks						

Form C-26
Revised 9/2000

ALABAMA DEPARTMENT OF TRANSPORTATION

Bituminous Material Price Adjustment

Project No. _____ Base Index for Asphalt Cement (Ib1) _____

County _____ Base Index for Emulsified Asphalt (Ib2) = _____

Definitions:

P = Total Partial Payment on Monthly Estimate.
P1 = Partial Payment for Asphalt Cement.
P2 = Partial Payment for Emulsified and Cutback Asphalt.
Ib1 = Base Index for Asphalt Cement.
Ib2 = Base Index for Emulsified and Cutback Asphalts.
Im1 = Monthly Index for Asphalt Cement.
Im2 = Monthly Index for Emulsified and Cutback Asphalt.
G1 = Gallons of Asphalt Cement used during month.
G2 = Gallons of Emulsified and Cutback Asphalt used during month.
D1 = Algebraic Difference (Im1 - Ib1).
D2 = Algebraic Difference (Im2 - Ib2).

Refer to Specification Section 109

Month	Year	(1) G1	(2) G2	(3) Im1	(4) Im2	(5)* D1	(6)* D2	(7) P1	(8) P2	(9) P

(7) = (1) X (5)
(8) = (2) X (6)
(9) = (7) + (8)

*Note: A "positive" D1 or D2 indicates payment to the Contractor.
A "negative" D1 or D2 indicates payment to the State.

Page _____ of _____ pages.

Form C-27
Rev. 9/2000

ALABAMA DEPARTMENT of TRANSPORATION

Construction Fuel Cost and Adjustment

Project No. _____ Bp _____

County _____ Ib _____

Refer to Specification Section 998 for Definition of Terms.

Month	Year	Im	Pc	Im/Ib	P

P = [Im + Ib] x Pc x Bp

Page _____ of _____ pages.

Form C-30

MONTHLY ESTIMATE DOCUMENTATION

Project No.: _____ County: _____ Page No.: _____

Item Number: Item Description:

Contract Quantity: Unit Price: Unit: Decimal Point For Payment:

Date	Location Where Work Performed	Quantity This Date	Quantity To Date	Quantity Paid	Est. No.	Reference	Test Report Quantity This Date	Test Report Quantity To Date

Go to Updated Editable Form C-34

FORM C-34
July - 1993

STATE OF ALABAMA HIGHWAY DEPARTMENT
STORMWATER INSPECTION CERTIFICATION REPORT

Division____ District____
Project_____
County_____
General Permit NO._____
Authorization No._____

Township_____
Range_____
Sections_____

Report No.____
Page____ of____
Date_____
Time_____

Site	Station	Dist. Lt/Rt	Latitude	Longitude	Rec. Stream	*Amt. Rain	Inspection Results

* include "a" if rainfall is accumulation

Go to Updated Editable Form C-34

Based upon these inspections which I or personnel under my direct supervision conducted, I certify that all pollution abatement/prevention facilities & BMPs have been implemented and maintained, except for those deficiencies noted above, in accordance with the pollution abatement/prevention & BMP plan filed with ADEM, good engineering practices, and with provisions and requirements of the above referenced NPDES permit and ADEM regulations.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Project Engineer	Signature	Date
Contractor Representative	Signature	Date

Go to Editable Form C-35 (english)

Go to Editable Form C-35 (metric)

FORM C-35 **ALABAMA DEPARTMENT OF TRANSPORTATION**

Revised 07-15-94 DRILLED SHAFT POURING RECORD

Project Number		County	Division
Bridge Station	To Station	Bridge Identification Number	
Road Between		and	
Contractor		Inspector	
Date	Bent No. & Lane	Shaft No.	Kind of Soil
Diameter of Shaft	Shaft Volume per Linear Foot (V_{LF})	Shaft Tip Elevation	

Load Number	Quantity (Cu. Yds.)	Slump (In.)	Pouring Time		Concrete Elevation	Tremie Tip Elevation	Cylinder Number
			Start	Finish			

V_Q = _____

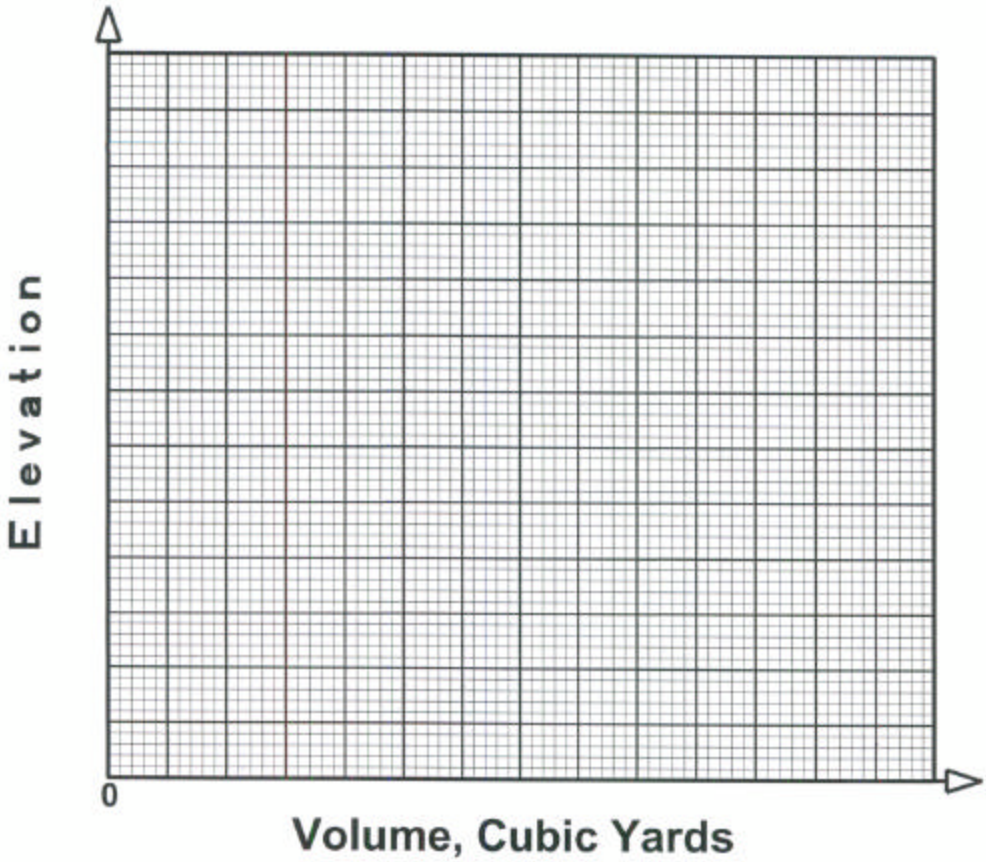
1. Top of concrete elevation at completion of pour prior to trimming any excess : _____
2. Shaft length before trimming : L = _____ Ft.
3. Corresponding theoretical volume : $V_T = V_{LF} \times L$ = _____ Cu. Yds.
4. Volume of excess in last truck : V_E = _____ Cu. Yds.
5. Volume of overflow (if any) : V_O = _____ Cu. Yds.
6. Actual shaft volume before trimming : $V_A = V_Q - V_E - V_O$ = _____ Cu. Yds.
7. Overpour : $\frac{V_A - V_T}{V_T} \times 100$ = _____ %

REMARKS

1. Record any problems with the operation of the mixing plant, supply irregularities (concrete delays), or possible setbacks (loss of priming in the tremie, movement of reinforcing steel, difficulties with extraction of temporary casing, caving of shaft wall, etc.) on the back of this sheet in the space provided for observations.
2. A theoretical volume versus elevation line should be plotted on the graph on the back of this sheet prior to concrete placement.
3. The actual concrete placement curve should be plotted during construction of the shaft. An elevation check should be taken as each truck pours out and the data recorded above and plotted on graph.
4. Any large variations of the actual concrete placement curve from the theoretical placement line should be investigated.
5. Draw sketch on back of this sheet showing location of shaft.

Correct_____ Approved_____

Project Engineer Division Engineer



OBSERVATIONS:

LOCATION OF SHAFT:

Go to Updated Editable Form C-37

Form C-37
Rev. 9/2000

ALABAMA DEPARTMENT OF TRANSPORTATION
STORMWATER NONCOMPLIANCE NOTIFICATION REPORT

Report No. _____
Site No. _____
General Permit No. _____
Authorization No. _____
Permit No. _____

Date _____
Division _____ District _____
Project No. _____
County _____

1. Description of Discharge _____

Noncompliance Parameter _____

Cause of Noncompliance _____

2. Period of Noncompliance _____

3. Corrective Measures _____

Project Engineer	Signature	Date
Contractor Representative	Signature	Date

ALDOT FORM DBE-10

1 PROJECT NUMBER	2. COUNTY:	3. DIVISION:
4 PRIME CONTRACTOR	5. DBE:	
6 DATE		

THIS IS TO CERTIFY THAT THE WORK LISTED BELOW HAS BEEN PERFORMED BY THE ABOVE DBE SUBCONTRACTING FIRM OR SUPPLIER

7 DESCRIPTION OF WORK	8 TYPE OF FIRM C / S	9 UNITS WORKED	10 UNIT PRICE	11 AMOUNT TO BE PAID	12 AMOUNT PAID TO DATE
ADDITIONAL COMMENTS IF NEEDED:				17 Total Amount Paid For Period:	

SIGNATURES:	NAME/TITLE:	DATE:
13 CONTRACTOR		
14 DBE SUBCONTRACTOR		
15 PROJECT ENGINEER		
16 Computer Entry By		

SEE BACK FOR INSTRUCTIONS

ESTIMATE # _____

WORK PERIOD: FROM _____ TO _____

```
FORM E-18B          ALABAMA DEPARTMENT OF TRANSPORTATION
 REV. 3/94                   BUREAU OF EQUIPMENT
                          PROPERTY TRANSFER REPORT

ACTION:      TRANSFER:                CREATED:
             TYPE: (   )REGULAR    (   )DIST/DIST    (   )TEMPORARY
TO:                                DIV/BUR:
      RECEIVER AUTHORIZATION:                          DATE:
      RECEIVED BY:                                     DATE:
FROM:                              DIV/BUR:
      DELIVERY AUTHORIZATION:                          DATE:
      DELIVERED BY:                                    DATE:
THE FOLLOWING EQUIPMENT IS BEING TRANSFERRED TO YOUR DIVISION/BUREAU.  ENTRY OF
THE RECEIVER AUTHORIZATION CODE DENOTES ACCEPTANCE OF THIS TRANSFER WHICH WILL
CAUSE AN UPDATE OF THE PROPERTY SYSTEM, PLACING THIS EQUIPMENT IN YOUR
INVENTORY ACCOUNT.
    EQUIP NO         DESCRIPTION                  SERIAL NUMBER       TAG




END TRANS=PF10  SCROLL FORWARD=PF8  SCROLL BACKWARD=PF7   REFRESH SCREEN=PF20
```

Form EEO-100 "Compliance Data Report" (Page 1 of 4)

EEO-100
5-96

ALABAMA DEPARTMENT OF TRANSPORTATION

COMPLIANCE DATA REPORT

1. STATE: ALABAMA

2. ☐ CONSTRUCTION ☐ NON-CONSTRUCTION

3. ☐ FEDERALLY ASSISTED

4. REVIEW REPORT NUMBER

5. REVIEW AUTHORITY
☐ EXECUTIVE ORDER 11246 AS AMENDED ☐ SEC 22(A) FED. HWY. ACT 1968 ☐ Special Provision #99 ☐ OTHER (Specify)

6. ☐ POST-AWARD REVIEW ☐ FOLLOW-UP REVIEW

7. ☐ ON-SITE ☐ HOME OFFICE

8. CONTRACT OR PROJECT NO.

9. CONTRACT VALUE

10. ☐ COMPREHENSIVE REVIEW

11. ☐ SPECIAL REVIEW

12. DATES OF REVIEW

13. CONTRACTOR IDENTIFICATION (Identify if Minority Enterprise) ☐ PRIME ☐ SUB

14a. NAME AND ADDRESS OF CONTRACTOR

15. NAME AND TITLE OF POLICY OFFICER

17. NAME AND TITLE OF EQUAL OPPORTUNITY EMPLOYMENT OFFICER.

14b. PROJECT ADDRESS IF DIFFERENT

16. NAME AND TITLE OF PROJECT OFFICER

18. IS WRITTEN AFFIRMATIVE ACTION COMPLIANCE PROGRAM AVAILABLE?
SEE ITEM 30H ☐ YES ☐ NO

19. CONTRACT OR PROJECT PRODUCTION SCHEDULE | BEGINNING DATE | ESTIMATED COMPLETION DATE | ANTICIPATED PEAK EMPLOYMENT DATES

20. DETERMINATION OF COMPLIANCE STATUS: ☐ IN-COMPLIANCE ☐ IN NON-COMPLIANCE ☐ SEE FINDINGS, CONCLUSIONS RECOMMENDATIONS AND AGREEMENT DETAILS PAGE 4 ITEM 31 and 32

21. SUB-CONTRACTORS, (Name, Address, Total Employees, Percent Minorities) (Indicate if a Minority Enterprise)

22. UNION AFFILIATIONS AND OTHER RECRUITING AND TRAINING DATA

UNION TITLE OR IDENTIFICATION A	UNION LOCAL NUMBER B	DOES UNION HAVE EXCLUSIVE REFERRAL RIGHTS C		DOES UNION SPONSOR OR PARTICIPATE IN PRE-APPRENTICE, APPRENTICE, OR POST-APPRENTICE TRAINING PROGRAMS? D		DOES CONTRACTOR SPONSOR PARTICIPATE IN PRE-EMPLOYMENT, APPRENTICE, OR POST EMPLOYMENT TRAINING PROGRAMS? E	
		YES	NO	YES	NO	YES	NO

23. OTHER RECRUITING SOURCES, ESPECIALLY MINORITY OR POVERTY ASSISTANCE ORIENTED

A. NAME OR OTHER IDENTIFICATION	B. ADDRESS

24. ON-SITE CONSTRUCTION EMPLOYMENT DATA

TABLE A

LINE NO.	JOB CATEGORIES	TOTAL EMPLOYEES		TOTAL MINORITIES		NEGRO		ORIENTAL		AMERICAN INDIAN		SPANISH SURNAMED AMERICAN		APPREN-TICES		ON THE JOB TRAINEES	
		M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
1	OFFICIALS (MANAGERS)																
2	SUPERVISORS																
3	FOREMEN																
4	CLERICAL																
5	EQUIPMENT OPERATORS																
6	MECHANICS																
7	TRUCK DRIVERS																
8	IRONWORKERS																
9	CARPENTERS																
10	CEMENT MASONS																
11	ELECTRICIANS																
12	PIPEFITTERS, PLUMBERS																
13	PAINTERS																
14	LABORERS, SEMI-SKILLED																
15	LABORERS, UNSKILLED																
16																	
17																	
18																	
19																	
20																	
21	TOTAL																
22	TOTAL EMPLOYMENT FROM PREVIOUS REPORT (IF ANY)																
	TABLE B																
23	APPRENTICES																
24	ON THE JOB TRAINEES																

25. SUMMARIZE NEW HIRES FOR THE CURRENT MONTH INDICATING MINORITIES AND NON-MINORITIES BY JOB CATEGORIES

26. SUMMARY ANALYSIS OF EMPLOYMENT DATA

27. CONTINUATION FROM PAGE 1-4 *(Show Item "No" Being Continued). IF ADDITIONAL SPACE IS REQUIRED, ATTACH SEPARATE SHEETS AND KEY ANSWERS TO ITEM NUMBERS*

PAGE 2

COMPANY WIDE EMPLOYMENT DATA

LINE NO.	OCCUPATIONS (A)	MALE EMPLOYEES: TOTAL MALES (B)	MALE EMPLOYEES: MINORITY GROUPS: NEGRO (C)	ORIENTAL (D)	AMERICAN INDIAN (E)	SPANISH AMERICAN (F)	FEMALE EMPLOYEES: TOTAL FEMALES (G)	NEGRO (H)	ORIENTAL (I)	AMERICAN INDIAN (J)	SPANISH AMERICAN (K)	TOTAL ALL EMPLOYEES (L)
1	OFFICIALS AND MANAGERS											
2	PROFESSIONALS											
3	TECHNICIANS											
4	SALES WORKERS											
5	OFFICE AND CLERICAL											
6												
7												
8												
9	Sub-total (White-collar)											
10	CRAFTSMEN (Skilled)											
11	OPERATIVES (Semi-skilled)											
12	LABORERS (Unskilled)											
13	SERVICE WORKERS											
14												
15												
16	Sub-total (Blue collar)											
17	TOTAL											
18	Total employment from previous report (if any)											
THE DATA BELOW SHALL ALSO BE INCLUDED IN THE FIGURES FOR THE APPROPRIATE OCCUPATIONAL CATEGORIES ABOVE												
19	ON THE JOB TRAINEES: WHITE COLLAR											
20	ON THE JOB TRAINEES: PRODUCTION											

29. SUMMARY ANALYSIS OR EMPLOYMENT AND TRAINING DATA

PAGE 3

Form EEO-100 "Compliance Data Report" (Page 4 of 4)

30. SUMMARY, FINDINGS, CONCLUSIONS, RECOMMENDATIONS, AND AGREEMENTS		
YES	NO	
		A. ARE REQUIRED POSTERS CONSPICUOUSLY DISPLAYED?
		B. HAVE REQUIRED WRITTEN NOTICES BEEN SENT TO UNIONS?
		C. ARE RECRUITING PUBLICATIONS USED TO SHOW "AN EQUAL OPPORTUNITY EMPLOYER"?
		D. ARE SUCH PUBLICATIONS CIRCULATED IN MINORITY ORIENTED COMMUNITIES?
		E. HAS CERTIFICATION RE: USE ON NON-SEGREGATED FACILITIES BEEN MADE?
		F. ARE SUCH FACILITIES IN EFFECT PROVIDED ON A NON-SEGREGATED BASIS?
		G. HAVE OTHER REPORTS REQUIRED BY FEDERAL, STATE, MUNICIPAL, OR OTHER STATUTES, REGULATIONS, DIRECTIVES, ETC., BEEN SUBMITTED?
		H. HAVE GOALS TARGETS AND OTHER CONDITIONS OF AFFIRMATIVE ACTION COMPLIANCE PROGRAMS BEEN IMPLEMENTED IN SATISFACTORY OR ACCEPTABLE MANNER?
		I. HAVE COMPLIANCE OR OTHER REVIEWS MADE BY OTHER AGENCIES RESULTED IN A DETERMINATION OF COMPLIANCE?
		J. ARE PRESCRIBED EQUAL EMPLOYMENT OPPORTUNITY CLAUSES INCLUDED IN ALL APPLICABLE PURCHASE ORDERS, SUB-CONTRACTS, AND COLLECTIVE BARGAINING UNION AGREEMENTS?
		K. ARE APPLICATIONS FOR EMPLOYMENT ACCEPTED, AND ARE SELECTIONS IN EFFECT MADE, WITHOUT REGARD TO RACE, COLOR, RELIGION, SEX OR NATIONAL ORIGIN?
		L. ARE TRANSFER, WAGE, TRAINING, MANPOWER DEVELOPMENT, PROMOTION AND OTHER EMPLOYMENT PRACTICES ACHIEVING EQUAL EMPLOYMENT RESULTS?

31. OTHER SIGNIFICANT OBSERVATIONS, COMMENTARY AND/OR DEFICIENCIES AND VIOLATIONS. *(SHOULD BE INDIVIDUALLY NUMBERED)*

32. RECOMMENDATIONS AND AGREEMENTS FOR CORRECTIVE ACTION AND TIME SCHEDULE *(INDIVIDUALLY NUMBERED)*

33. CONDUCTED BY	☐ A.	SIGNATURE, TITLE AND DATE		
	☐ B. DIVISION OFFICE	SIGNATURE, TITLE AND DATE		
34. REVIEWED BY FHWA (INCLUDE COMMENTARY MEMO IF NON-CONCURRENCE)	☐ A. REGIONAL ADMINISTRATOR	☐ CONCUR	☐ DO NOT CONCUR	SIGNATURE AND DATE
	☐ B. REGIONAL OFFICE OF CIVIL RIGHTS	☐ CONCUR	☐ DO NOT CONCUR	
	☐ C. DIVISION ENGINEER	☐ CONCUR	☐ DO NOT CONCUR	

OMB NO. 2125-0033

U.S. Department of Transportation
Federal Highway Administration

STATEMENT OF MATERIALS AND LABOR USED BY CONTRACTORS ON HIGHWAY CONSTRUCTION INVOLVING FEDERAL FUNDS

PART A *To be completed by FHWA or State Highway Personnel (See instructions on reverse)*

STATE*	COUNTY	FEDERAL PROJECT NO.*	URBAN (RURAL (

ITEM	DESCRIPTION		ROADWAY	BRIDGE *(Over 20 ft)*	DATE STARTED*
	CONSTRUCTION TYPE CODES				
1	LENGTH OF PROJECT	MILES			DATE COMPLETED*
2	FINAL* CONSTRUCTION COST	DOL.			TOTAL NO. BRIDGES

PART B *To be completed by; contractor - see instructions on reverse (REMARKS Attach a plain sheet of paper)*

3	**LABOR*** TOTAL PROJECT	TOTAL LABOR-HOURS	GROSS EARNINGS

ITEM	DESCRIPTION	UNIT	PROJECT QUANTITY
4	TOTAL COST OF ALL MATERIALS AND SUPPLIES*	DOL.	
5	PETROLEUM PRODUCTS*	GAL.	
6	CEMENT	BBL.	
7		LB.	
8		TON.	
9	AGGREGATES PURCHASED	TON.	
10		CU. YD.	
11	BITUMINOUS MATERIAL	GAL.	
12	LUMBER	THSD. BD. FT.	
13	REINFORCING STEEL	LB.	
14	STRUCTURAL STEEL	LB.	
15	READY-MIXED CONCRETE	CU. YD.	
16	PREMIXED BITUMINOUS PAVING MATERIALS	TON.	
17	AGGREGATES PRODUCED	TON	
18		CU. YD.	
19	MISCELLANEOUS STEEL	LB.	
20	NOISE BARRIERS	LIN. FT.	
21	GUARDRAIL	LIN. FT.	
22	BRIDGE RAIL	LIN. FT.	
23	FINAL CONTRACT AMOUNT FOR SIGNS	DOL.	
24	FINAL CONTRACT AMT. FOR LIGHTING	DOL.	
25	FINAL CONTRACT AMT. FOR TRAFFIC SIGNALS	DOL.	

CULVERT ITEMS

	SIZE *(In.)*	LGTH *(Lin ft)*
26 CORR. STEEL CULVERT		

27 CONCRETE PIPE

28 CLAY PIPE

SIZE *(In.)*	LGTH *(Lin*

29 CORR. ALUMINUM CULVERT

30 PLASTIC PIPE

*MUST BE REPORTED ON ALL REPORTS

REVIEWED BY

DATE

FORM FHWA-47 (Rev. 7-98) (INF4.2, 7/29/98) PREVIOUS EDITIONS ARE OBSOLETE This form was electronically produced by Elite Federal Forms, Inc.

DETAIL COST ESTIMATE

AUTAUGA COUNTY, ALABAMA PAGE NO. 1

ESTIMATE NUMBER : Proj Ctrl # PCN : Proj Ctrl # PROJECT NO. : Project Number CONTRACT ID :

PCN : Proj Ctrl # Type of Work
On a specific road from some reference point to another

CATEGORY : 0001 Roadway, Bridge, etc.

FUNDING SOURCE(S) AND PARTICIPATION : DFLT Dummy Project Level Funding 100.00 %

CONSTRUCTION TYPE :
WORK CLASSIFICATION : ROAD Roadway CAT LENGTH : 0.0000 KILOMETERS
CONSTRUCTION CLASS : 0000 DEFAULT FUNDING CATEGORY CAT WIDTH : 0.0000 METERS

LINE NO.	ITEM NUMBER	ITEM DESCRIPTION	ESTIMATED QUANTITY	ITEM UNIT	UNIT PRICE	AMOUNT
0010	201B000	Clearing Any additional information can be added here.	1.000	HA	1,000.00000	1,000.00

CATEGORY TOTAL	$	1,000.00
ENG & CONTG	$	0.00
TOTAL	$	1,000.00

Roadway, Bridge, etc.
LENGTH: 0.0000 KM
DFLT 1,000.00
Total Estimated 1,000.00

PROJECT TOTAL	$	1,000.00
ESTIMATE TOTAL	$	1,000.00

SUMMARY FOR PROJECT

PCN: Proj Ctrl #
PROJECT NO.: Project Number

	APPN	TOTAL ESTIMATE	FA FUNDS	STATE FUNDS	LENGTH
Roadway, Bridge, etc.	DFLT	1,000.00	1,000.00		0.000
TOTAL EST COST		1,000.00	1,000.00	0.00	0.000

SIGNED

OFFICE ENGINEER

ALABAMA DEPARTMENT OF TRANSPORTATION

Form 3 Rev. 5-5-94-1

PROJECT VOUCHER PAYABLE

Sheet _____ of _____

Division _____ District _____ County _____

In a/c with _____
Contractor

_____
Address

_____
Project Description

Work performed from _____ to _____

Estimate No. _____
Project No. _____
Code No. _____

ITEM DESCRIPTION	UNIT	UNIT PRICE	THIS MONTH		TO DATE	
			QUANTITY	AMOUNT	QUANTITY	AMOUNT

ALABAMA DEPARTMENT OF TRANSPORTATION

FORM 3 Rev. 7/94 — **PROJECT VOUCHER PAYABLE**

Sheet_____ of _____

Division _____ District _____ County _____

In a/c with _____
Contractor

_____
Address

_____
Project Description

Estimate No. _____
Project No. _____
Code No. _____

Work performed from _____ to _____

ITEM DESCRIPTION	UNIT	UNIT PRICE	THIS MONTH			TO DATE		
			QUANTITY	AMOUNT		QUANTITY	AMOUNT	
TOTALS								
LESS % WITHHELD								
LESS PREVIOUS PAYMENT								
LESS DEDUCTIONS								
AMOUNT PAYABLE THIS VOUCHER								

We hereby accept this estimate as being correct, due and unpaid

_____
Contractor's Authorized Representative

I certify this estimate to be correct, due and unpaid.

Approved: _____
Division Engineer

_____
Resident — Project — Engineer

STATE OF ALABAMA, County of _____

Sworn and subscribed to before me this _____ day o

_____ 19 _____

_____
Notary Public

REVISED
05-05-71

MB 01
Page 1 of 3

ALABAMA DEPARTMENT OF TRANSPORTATION
Permit Agreement for the Accommodation of Utility Facilities on Public Right-of-Way

Project Number: _____
Permit No. _____
P.E. _____
R.O.W. _____
Utilities _____
Construction _____
Maintenance Section _____
Location of Accommodation:
Kilometer post _____ to _____

THIS AGREEMENT is entered into this the _____ day of _____, 19___, by and between the Alabama Department of Transportation acting by and through its Transportation Director hereinafter referred to as the STATE and _____ a Utility hereinafter referred to as the APPLICANT.

WITNESSETH

WHEREAS, the APPLICANT desires to have its facilities accommodated on public highway right-of-way in _____ County, Alabama, said project or maintenance section being designated as _____, and consisting approximately of the following:
_____
_____
_____; and

WHEREAS, the STATE hereby grants to the APPLICANT approval to cross or locate its facilities on the public right-of-way at the location and in the manner hereinafter set forth:

NOW, THEREFORE, it is agreed by and between the parties hereto as follows:

1. The APPLICANT will install its facilities on public right-of-way in accordance with plans and specifications of the APPLICANT as approved by the STATE which plans and specifications are hereby made a part hereof by reference.

2. In the installation of facilities and performing work under this agreement, the APPLICANT will conform to the provisions of the latest edition of the Alabama Department of Transportation Utility Manual, which manual is of record in the Department of Transportation and is hereby a part hereof by reference.

3. The national Manual on Uniform Traffic Control Devices, latest edition, is hereby made a part hereof by reference and will be conformed to as the provisions thereof are applicable to such work. Such Manual is of record in the Alabama Department of Transportation at the execution of this Agreement.

4. The Clean Water Act, 1987 and the Alabama Nonpoint Source Management Program, 1989 are hereby made a part hereof by reference and will be conformed to by the APPLICANT as the provisions thereof are applicable hereto.

The APPLICANT will conform to the regulations of the Environmental Protection Agency (EPA) and of the Alabama Department of Environmental Management (ADEM), latest edition, for both installation and maintenance of such facilities.

REVISED

MB 01
Page 2 of 3

5. If hazardous materials, wastes, substances, or as otherwise defined by Code of Alabama§ 6-5-332.1 (a)(2) (1993 Repl. Vol.) are encountered in the execution of this Agreement it will be the responsibility of the APPLICANT to notify the proper agency responsible for said hazardous materials and to comply with any and all environmental regulations as established by the Environmental Protection Agency (EPA), Alabama Department of Environmental Management (ADEM), and of the Occupational Safety and Health Administration (OSHA) in the proper disposition of the hazardous materials encountered.

6. The APPLICANT will file with the STATE an acceptable certified check or bond in the penal amount of $_____ to guarantee the faithful performance of this permit contract in its entirety. Upon satisfactory completion and acceptance of all work provided for in this permit contract, the check or bond, as applicable, will be returned to the APPLICANT; otherwise, the proceeds from the check, or any amount received by the STATE as a result of the bond, will be applied to complete and fulfill the permit contract terms.

7. Reimbursement for future relocations of the APPLICANT'S facilities will be in accordance with State law in effect at the time such relocations are made.

8. The APPLICANT will be obligated for the payment of damages occasioned to private property, public utilities or the general public, caused by the legal liability (in accordance with Alabama and/or Federal law) of the APPLICANT, its agents, servants, employees or facilities.

9. The APPLICANT will have a copy of this Agreement on the project site at all times while said work is being performed.

10. Nothing contained in this Permit Agreement, nor the issuance or receipt thereof, shall be construed to alter or affect the title of the STATE to the public right-of-way nor to increase, decrease or modify in any way the rights of the APPLICANT provided by law with respect to the construction, operation or maintenance of its facilities on the public right-of-way.

11. The installation of the facilities and related work covered by this Agreement shall be completed within one year from the date shown on this Agreement, otherwise this Agreement becomes null and void. Once work is begun the APPLICANT shall pursue the work continuously and diligently until completion.

12. The APPLICANT will perform or cause to be performed the work applied for in this permit contract and will restore the highway in the work area in as good condition as the same was prior to the work and will maintain the accomplished work and highway work area in a condition satisfactory to the Alabama Department of Transportation for a period of one year from acceptance by the Department of the completion of work applied for by APPLICANT.

13. The APPLICANT stipulates that the specific use of these facilities located upon public right-of-way is_____

_____

_____.

APPLICANT further stipulates that should this specific use change at any time in the future that the APPLICANT will notify the STATE immediately of the change.

REVISED
05-05-97

MB 01
Page 3 of 3

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed by their respective officers, officials and persons thereunto duly authorized, to be effective on the day and year first above stated.

WITNESS:

_____

_____
(Legal Name of Applicant)

By:_____
(Signature and Title)

_____
(Typed or Printed Name)

_____
(Typed or Printed Title)

_____
(Address)

_____
(Telephone)

RECOMMENDED FOR APPROVAL:

By:_____
District Engineer

By:_____
Division Engineer

ALABAMA DEPARTMENT OF TRANSPORTATION
ACTING BY AND THROUGH ITS
TRANSPORTATION DIRECTOR

By:_____
Maintenance Engineer / Division Engineer

REVISED
05-05-97

MB 02
Page 1 of 3

ALABAMA DEPARTMENT OF TRANSPORTATION
SPECIAL PERMIT AGREEMENT FOR
INSTALLATION OF UTILITIES ON HIGHWAY RIGHTS-OF-WAY

Permit No _____
Maintenance Section _____
Accommodation at Kilometer post _____ (to _____)

THIS AGREEMENT is entered into this the _____ day of _____, 19___, by and between the Alabama Department of Transportation acting by and through its Transportation Director hereinafter referred to as the STATE and _____ hereinafter referred to as the APPLICANT.

WITNESSETH

WHEREAS, the APPLICANT desires to have its facilities accommodated on public highway right-of-way in _____ County, Alabama, on the maintenance section being designated as _____, and consisting approximately of the following: _____

_____

_____

_____; and

WHEREAS, the STATE hereby grants to the APPLICANT permission to cross or locate its facilities on the public right-of-way at the location and in the manner hereinafter set forth:

NOW, THEREFORE, it is agreed by and between the parties hereto as follows:

1. The APPLICANT will install its facilities on public right-of-way in accordance with plans and specifications of APPLICANT as approved by the STATE so as not to interfere with the maintenance of the highway, which plans are made a part hereof by reference.

2. In the installation of facilities and performing work under this agreement, the APPLICANT will conform to the provisions of the latest edition of the Alabama Department of Transportation Utility Manual, which manual is of record in the Department of Transportation and is hereby a part hereof by reference.

3. The national Manual on Uniform Traffic Control Devices, latest edition, is hereby made a part hereof by reference and will be conformed to as the provisions thereof are applicable to such work. Such Manual is of record in the Alabama Department of Transportation at the execution of this Agreement.

4. The Clean Water Act, 1987 and the Alabama Nonpoint Source Management Program, 1989 are hereby made a part hereof by reference and will be conformed to by the APPLICANT as the provisions thereof are applicable hereto.

APPLICANT will conform to the regulations of the Environmental Protection Agency (EPA) and of the Alabama Department of Environmental Management (ADEM), latest edition, for both installation and maintenance of such facilities.

5. If hazardous materials, wastes, substances, or as otherwise defined by Code of Alabama§ 6-5-332.1 (a)(2) (1993 Repl.Vol.) are encountered in the execution of this Agreement it will be the responsibility of the APPLICANT to notify the proper agency responsible for said hazardous materials and to comply with any and all environmental regulations as established by the Environmental Protection Agency (EPA), Alabama Department of Environmental Management (ADEM), and of the Occupational Safety and Health Administration (OSHA) in the proper disposition of the hazardous materials encountered.

6. The APPLICANT will be obligated for the payment of damages occasioned to private property, public utilities or the general public, caused by the legal liability (in accordance with Alabama and/or Federal law) of the APPLICANT, its agents, servants, employees or facilities.

7. The APPLICANT will file with the STATE an acceptable certified check or bond in the penal amount of $_____ to guarantee the faithful performance of this permit contract in its entirety. Upon satisfactory completion and acceptance of all work provided for in this permit contract, the check or bond, as applicable, will be returned to the APPLICANT; otherwise, the proceeds from the check, or any amount received by the STATE as a result of the bond, will be applied to complete and fulfill the permit contract terms.

8. APPLICANT will have a copy of this Agreement on the project site at all times work is being performed.

9. This Agreement does not constitute or grant to the APPLICANT any right, title, property interest, claim or control in or to any part of the highway right-of-way.

10. The installation of the facilities and related work covered by this Agreement shall be completed within one year from the date shown on this Agreement, otherwise this Agreement becomes null and void. Once work is begun the APPLICANT shall pursue the work continuously and diligently until completion.

11. The APPLICANT will perform or cause to be performed the work applied for in this permit contract and will restore the highway in the work area in as good condition as the same was prior to the work and will maintain the accomplished work and highway work area in a condition satisfactory to the Alabama Department of Transportation for a period of one year from acceptance by the Department of the completion of work applied for by APPLICANT.

REVISED

MB 02
Page 3 of 3

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed by their respective officers, officials and persons thereunto duly authorized, to be effective on the day and year first above stated.

WITNESS:

_____
(Legal Name of Applicant)

_____

By:_____
(Signature and Title)

_____
(Typed or Printed Name)

_____
(Typed or Printed Title)

_____
(Address)

RECOMMENDED FOR APPROVAL:

_____
(Telephone)

BY:_____
District Engineer

ALABAMA DEPARTMENT OF TRANSPORTATION
ACTING BY AND THROUGH ITS
TRANSPORTATION DIRECTOR

By:_____
Division Engineer

By:_____
Maintenance Engineer

REVISED
05-05-97

MB 03
Page 1 of 3

ALABAMA DEPARTMENT OF TRANSPORTATION PERMIT AGREEMENT FOR THE ACCOMMODATION OF UTILITY TYPE FACILITIES ON PUBLIC RIGHT-OF-WAY

Permit No. _____
Maintenance Section _____
Kilometer post _____ to _____
Length of Facility _____
Amount Due Annually _____

THIS AGREEMENT is entered into this the_____ day of _____, 19____ by and between the Alabama Department of Transportation acting by and through its Transportation Director hereinafter referred to as the STATE and _____ hereinafter referred to as the APPLICANT.

WITNESSETH:

WHEREAS, the APPLICANT desires to have its facilities accommodated on public highway right-of-way in_____ County, Alabama, on the maintenance section being designated as _____, and consisting approximately of the following:

_____

_____; and

WHEREAS, the STATE hereby grants to the APPLICANT approval to cross or locate its facilities on the public right-of-way at the location and in the manner hereinafter set forth:

NOW, THEREFORE, it is agreed by and between the parties hereto as follows:

1. The APPLICANT will install its facilities on public right-of-way in accordance with plans and specifications of APPLICANT as approved by the STATE which plans and specifications are hereby made a part hereof by reference. Any variation from the approved plans will require approval from the STATE.

2. In the installation of facilities and performing work under this Agreement, the APPLICANT will conform to the provisions of the latest edition of the Alabama Department of Transportation Utility Manual, which manual is of record in the Department of Transportation and is hereby a part hereof by reference.

3. The national Manual on Uniform Traffic Control Devices, latest edition, is hereby made a part hereof by reference and will be conformed to as the provisions thereof are applicable to such work. Such Manual is of record in the Department of Transportation at the execution of this Agreement.

4. The Clean Water Act, 1987 and the Alabama Nonpoint Source Management Program, 1989 are hereby made a part hereof by reference and will be conformed to by the APPLICANT as the provisions thereof are applicable hereto.

The APPLICANT will conform to the regulations of the Environmental Protection Agency (EPA) and of the Alabama Department of Environmental Management (ADEM), latest edition, for both installation and maintenance of such facilities.

5. If hazardous materials, wastes, substances, or as otherwise defined by Code of Alabama§ 6-5-332.1 (a)(2) (1993 Repl.Vol.) are encountered in the execution of this Agreement it will be the responsibility of the APPLICANT to notify the proper agency responsible for said hazardous materials and to comply with any and all environmental regulations as established by the Environmental Protection Agency (EPA), Alabama Department of Environmental Management (ADEM), and of the Occupational Safety and Health Administration (OSHA) in the proper disposition of the hazardous materials encountered.

6. The APPLICANT will file with the STATE an acceptable certified check or bond in the penal amount of $_____ to guarantee the faithful performance of this permit contract in its entirety. Upon satisfactory completion and acceptance of all work provided for in this permit contract, the check or bond, as applicable, will be returned to the APPLICANT; otherwise, the proceeds from the check, or any amount received by the STATE as a result of the bond, will be applied to complete and fulfill the permit contract terms.

7. If at any time it is determined by the STATE that any or all of the APPLICANT'S facilities covered by this Agreement need to be relocated, repaired or removed within or from the STATE right-of-way, the APPLICANT will accomplish such relocation, repair or removal, within one hundred eighty days from the date of written notice therefor from the STATE. Relocation, repair or removal will be at the sole expense of the APPLICANT, and the APPLICANT hereby waives any claim to any payment for cost and expense incurred therefor.

8. In the event the APPLICANT fails to commence the relocation, repair or removal of its facilities within or from the STATE right-of-way within thirty (30) days from the date of written notice from the STATE to the APPLICANT seeking any such relocation, repair, or removal or in the event it is determined by the STATE that the APPLICANT will not accomplish the relocation, repair or removal within the time period of one hundred eighty days from commencement, the STATE may in the discretion of the Transportation Director, on the happening of either event above stated, cause the relocation, repair or removal to be accomplished in a manner acceptable to the STATE and the APPLICANT will promptly reimburse the STATE for any and all sums actually expended for and in any way connected with such relocation, repair or removal by the STATE. The APPLICANT does hereby release the STATE, its officers, officials, employees, and agents from any and all loss, claims, and liability arising or resulting to the APPLICANT from the acts by the STATE above stated.

9. The APPLICANT will be obligated for the payment of damages occasioned to private property, public utilities or the general public, caused by the legal liability (in accordance with Alabama and/or Federal law) of the APPLICANT, its agents, servants, employees or facilities.

10. The APPLICANT will have a copy of this Agreement on the project site at all times while said work is being performed.

11. The APPLICANT will pay the STATE the sum of $_____ annually, for each kilometer of_____ placed on the STATE right-of-way. The first payment will be made at the time of execution of this Agreement and subsequent payments will be made annually on the anniversary date of the Agreement. The APPLICANT will pay an additional ten percent (10%) of the amount due for each month that the scheduled payment is delinquent. Should the payment be delinquent by more than twelve months the facilities will be considered abandoned by the APPLICANT and the APPLICANT does hereby on the happening of such event relinquish all rights to the facilities, including ownership, and the STATE will have and is hereby granted the authority and right to dispose of the facilities as deemed appropriate by the STATE.

12. This Agreement does not constitute or grant to the APPLICANT any right, title, property interest, claim or control in or to any part of the highway right-of-way.

13. The installation of the facilities and related work covered by this Agreement shall be completed within one year from the date shown on this Agreement, otherwise this Agreement becomes null and void. Once work is begun the APPLICANT shall pursue the work continuously and diligently until completion.

14. The APPLICANT will perform or cause to be performed the work applied for in this permit contract and will restore the highway in the work area in as good condition as the same was prior to the work and will maintain the accomplished work and highway work area in a condition satisfactory to the Alabama Department of Transportation for a period of one year from acceptance by the Department of the completion of work applied for by APPLICANT.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed by their respective officers, officials and persons thereunto duly authorized, to be effective on the day and year first above stated.

REVISED

MB 03
Page 3 of 3

WITNESS:

_____

_____
(Legal Name of Applicant)

BY: _____
(Signature and Title)

APPROVED AS TO FORM:

_____
(Typed or Printed Name)

BY: _____
Chief Counsel,
Alabama Department of Transportation

_____
(Typed or Printed Title)

_____
(Address)

RECOMMENDED FOR APPROVAL:

_____
(Telephone)

BY: _____
District Engineer

ALABAMA DEPARTMENT OF TRANSPORTATION
ACTING BY AND THROUGH ITS
TRANSPORTATION DIRECTOR

BY: _____
Division Engineer

BY: _____
Maintenance Engineer

Form OE-2
1-99

Supplemental Agreement

STATE OF ALABAMA
MONTGOMERY, ALABAMA

Number _____ Date

This agreement is made and entered into by and between the State of Alabama by and through its Department of Transportation and _____, Contractor, as an amendment to a contract made between the State of Alabama and the Contractor on the _____ day of _____, 19_____, for the construction of _____, Project No. _____, in _____ County, Alabama; and whereas _____ is Surety therefor; Witnesseth: **WHEREAS**, certain items of construction encountered necessary to the project are not covered by the original contract on the above project, and in keeping with Section 23-1-60, Code AL, 1975, the following items of work, constitute that which is to be performed by the contractor under this Supplemental Agreement, to-wit:

Any and all certifications and warrants to the original agreement are hereby made applicable to this Supplemental Agreement by reference. The following also are applicable to this Supplemental Agreement:

FUNDS SHALL NOT BE CONSTITUTED AS A DEBT

It is agreed that the terms and commitments contained herein shall not be constituted as a debt of the State of Alabama in violation of Article 11, Section 213 of the Constitution of Alabama, 1901, as amended by Amendment No. 26. It is further agreed that if any provision of this agreement shall contravene any statute or Constitutional provision of amendment, either now in effect or which may, during the course of this agreement, be enacted, then the conflicting provision in the agreement shall be deemed null and void.

TERMINATION DUE TO INSUFFICIENT FUNDS

a. If the agreement term is to exceed more than one fiscal year, then said agreement is subject to termination in the event that funds should not be appropriated for the continued payment of the agreement in subsequent fiscal years.

b. In the event of proration of the fund from which payment under this agreement is to be made, agreement will be subject to termination.

Funding for this project has previously been approved and obligated.

1

In consideration of the changes set forth in this Supplemental Agreement, a time extension of _____ days is granted for completion of the project. **NOW, THEREFORE,** the parties to the original contract above mentioned do hereby agree that the original contract be and is hereby amended by this Supplemental Agreement consisting of the above mentioned items of work and prices, and agree that this Supplemental Agreement is hereby made a part of the original contract on the above project to be performed under the Specifications thereof, and that the original contract including amendments thereto, if any, is in full force and effect except so far as it is amended by this Supplemental Agreement. The Surety on the performance bond of the original contract joins in the execution of this Supplemental Agreement in recognition and agreement that all bonds executed by the Surety in connection with the original contract are further applicable to this Supplemental Agreement which is hereinabove made a part of the original contract including amendments if any.

IN WITNESS WHEREOF, the three parties hereto have executed this agreement by those persons duly authorized to execute same, to be effective upon its approval by the Governor of Alabama.

STATE OF ALABAMA, BY AND THROUGH
ITS DEPARTMENT OF TRANSPORTATION

RECOMMENDED: _____ By: _____
Johnny L. Harris — G. M. Roberts
Division Engineer — Transportation Director

RECOMMENDED: _____ By: _____
John P. Courson — Member of Firm
County Transportation Engineer — _____
(Type Name and Title)

RECOMMENDED: _____
Terry McDuffie — Contractor Firm
Construction Engineer

RECOMMENDED: _____
Ray D. Bass — Surety
Chief Engineer

*APPROVED AS TO FORM BY/FOR: _____ By: _____
Jim R. Ippolito, Jr. — Attorney in Fact
Chief Counsel — _____
(Type Name)

*To the best of my knowledge, this Supplemental Agreement complies with all applicable laws, rules and regulations of the State of Alabama.

The within and foregoing Supplemental Agreement is hereby approved on this the _____ day of _____, 19____.

_____
Don Siegelman
Governor of Alabama

2

Form OE-7
Rev. 11-97

REQUEST FOR PERMISSION TO SUBLET WORK

Director - Alabama Department of Transportation
ATTN: OFFICE ENGINEER
1409 Coliseum Boulevard, Room E-101
Montgomery, Alabama 36130

Submit all Forms in Duplicate

Project No. (1)_____
County (2)_____

Dear Sir:

Your approval is requested for subletting the following items of work included in our contract with the Alabama Department of Transportation for the construction of the above numbered project to (3)_____ of (4)_____

Item No. (5)	Item/Description (6)	Quantity (7)	Unit (8)	Unit Price (9)	Amount (10)

The subcontract for this work, if this sublet request is approved, will contain all pertinent provisions and regulations of prime contract, and subcontractor has been furnished with copy of the pertinent provisions and requirements.

Sincerely,

(11) (a)_____
Surety

(12) (a)_____
Prime Contractor

(b)_____
AL Contractor's License Number

BY: (b)_____

BY: (c)_____

I hereby certify that I have been furnished with a copy of pertinent provisions and regulations of prime contract, including labor standards clauses, that relate to these items of work.

(13) (a) _____
Subcontractor

(b)_____
AL Contractor's License Number

BY:(c)_____

STATEMENT REQUIRED TO BE SIGNED BY PROPOSED SUBCONTRCTOR PURSUANT TO REQUIREMENT BY THE EQUAL OPPORTUNITY REGULATIONS OF THE SECRETARY OF LABOR (41 CFR 60-1.7 (b) (1)

I hereby certify that _____
(Name of Proposed Subcontractor)
(has) (has not) participated in a previous contract or subcontract subject to the Equal Opportunity Clause, as required by Executive Orders 10925, 11114, or 11246.

Signed: _____

Title: _____

If the proposed subcontractor has heretofore participated in contracts or subcontracts subject to the Equal Opportunity Clause, the following statement must be executed:

I hereby certify that _____ (has) (has not)
(Name of Proposed Subcontractor)
filed with the Joint Reporting Committee, the Director of OFCC, any Federal Agency or the former President's Committee on Equal Employment Opportunity, all reports due under the applicable filing requirements of those organizations. All reports due are considered to be those requested by one of these committees or agencies. (Strike out appropriate word or words above.)

Date: _____ Signed: _____

Title: _____
Individual Signing Proposed Subcontract

Currently, Standard Form 100 (EEO-1) is the only report required by the Executive Orders or their implementing regulations.

Proposed prime contractors and subcontractors who have participated in a previous contract or subcontract subject to the Executive Orders and have not filed the required reports should note that 41 CFR 60-1.7(b) (1) prevents the award of contracts and subcontracts unless such contractor submits a report covering the delinquent period or such other period specified by the Federal Highway Administration or by the Director, Office of Federal Contract Compliance, U.S. Department of Labor.

Statement Required To Be Submitted By Proposed Subcontractor Pursuant to Notice Of Requirement For Affirmative Action to Ensure Equal Employment Opportunity (Executive Order 1246) and Regulations in 41 CFP Part 60-4 On All Federal And Federally Assisted Contracts in Excess of $10,000.00.

Project Number_____

County_____

Name of Subcontractor_____

Mailing Address_____
Street City State Zip

Telephone Number _____/_____
A.C.

Employer Identification Number_____

"Employer Identification Number" means the Federal Social Security Number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.

Amount of Contract: $_____

Estimate Starting Date _____ Estimate Completion Date _____

State-County-City Where Work is to be performed _____

_____

Information Furnished By _____

Title _____

The above information must be furnished for approval of your subcontract.

DETAILED INSTRUCTIONS FOR COMPLETING REQUEST FOR PERMISSION TO SUBLET WORK FORMS

(1) Project number shall be exactly as it appears on your contract with the Alabama Department of Transportation.

(2) Show county or counties as shown on contract.

(3) Show proposed subcontractor's name as it appears on General Contractor's License, Certificate of Insurance and Qualification Letter

(4) Give subcontractor's city and state.

(5) Item numbers shall correspond to those in the contract. (ex: 600A-000).

(6) Item description shall be complete, just as it appears in your contract.*

(7) Quantity shall correspond to contract quantity.*

(8) Unit must correspond to contract unit (ex: ton, sy, cy, etc.)

(9) Unit price shall be the same as that included in the contract.*

(10) Amount of each item shall correspond to the contract amount for this item. If necessary, attachment(s) may be used for additional items. Total amount of all items in this sublet shall equal total amount of sublet shown by you on the attached Affirmative Action Form.

(11) (a) Surety's name
(b) Signature and seal of authorized agent

(12) (a) Prime contractor's name shall be shown exactly as it appears on your contract.
(b) Prime contractor's license number
(c) Signature shall be legible

(13) (a) Subcontractor's name shall be exactly as it appears on his Qualification Letter and General Contractor's License.
(b) Subcontractor's License Number
(c) Subcontractor's signature shall be legible

*Partials: If partial quantity is used, an explanation shall be provided showing exactly what portion of quantity will be performed by subcontractor. If partial unit price, such as hauling, the unit (ex.: tons, cy, sy, etc.) must agree with the contract unit. However, a unit corresponding to the subcontract agreement unit may be used in the explanation of the partial. Partial unit price, whether hauling, labor, or whatever, shall be the actual unit price agreed upon with the subcontractor. If partial quantity or partial unit price, give complete description, then show (partial) followed by an explanation of what portion of this work is to be performed by subcontractor. For expediency, asterisk(s) and footnotes may be used. Executed requests for permission to sublet work must be submitted in duplicate.

NOTE: On all federal-aid projects prime contractor shall be responsible for seeing that the two attached federal forms be completed. Equal employment opportunity statement shall be completed, signed and dated by contractor, indicating has/has not, as appropriate, and submitted in duplicate. On all federally assisted subcontracts in excess of $10,000.00, affirmative action form shall be completed and submitted induplicate. The amount shown on the affirmative action form shall equal the amount of the sublet. Please ensure that all information is supplied on these forms.

Copy of subcontract required for all projects. Subcontract shall include following statement: "This subcontract includes the appropriate provisions of the contract between (_____) (prime contractor) and the Alabama Department of Transportation, dated _____(date signed by Governor)."

Mail completed assembly to: Alabama Department of Transportation
1409 Coliseum Blvd., Room E-101
Montgomery, AL 36130-3050

Form OE-IF (Rev. 9/16/97)

ALABAMA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION CHANGE REQUEST

Project No.: _____ Change Request No.
County: _____ Date:

The following changes on the above numbered project, with stations, quantities and items involved, are recommended for the reasons stated below:

(1) **Location, Description and Reason for Change**

(2) **CONSTRUCTION PLANS**

Station	Item	Quantity	Unit Price	Amount
			Total	$

PROPOSED CHANGES

Station	Item	Quantity	Unit Price	Amount
			Total	$
			Net Increase(+)	$
			Net Decrease(-)	$

(3) Total U.S. Agreement Estimate
or Modified Agreement Estimate: Dated: $

	Plus	Minus
Approved Construction Changes Not Included in Above Estimate Amount:	$	$
This Construction Change Amount:		
Totals:	$	$

Net Total (+) _____
(-) _____

Construction Engineering on Net Total (+) _____
Revised Total Estimated Cost: (-) _____
Overrun: _____
Underrun: _____

Submitted:

_____
Project Engineer

Recommended:

_____
Division Engineer

Date: _____

Approved:

_____
Construction Engineer

Date: _____

Concurrence Recommended:

_____
_____ Engineer
Federal Highway Administration

Date: _____

_____
Division Administrator
Federal Highway Administration

Date: _____

FEDERAL-AID HIGHWAY CONSTRUCTION CONTRACTORS ANNUAL EEO REPORT

OMB NO.

Report For

JULY _____ 19 __ __

1. CHECK APPROPRIATE BLOCK	2. NAME AND ADDRESS OF FIRM	3. FEDERAL-AID PROJECT NUMBER	4. TYPE OF CONSTRUCTION
☐ Contractor ☐ Subcontractor			

5. COUNTY AND STATE	6. PERCENT COMPLETE	7. BEGINNING CONSTR. DATE	8. DOLLAR AMOUNT OF CONTRACT	9. ESTIMATED PEAK EMPLOYMENT	
				(a) Month and Year	(b) Number of Employees

10. EMPLOYMENT DATA

Table A

JOB CATEGORIES	TOTAL EMPLOYEES		TOTAL MINORITIES		BLACK Not of Hispanic Origin		HISPANIC		AMERICAN INDIAN OR ALASKAN NATIVE		ASIAN OR PACIFIC ISLANDER		WHITE Not of Hispanic Origin	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
OFFICIALS (Managers)														
SUPERVISORS														
FOREMEN/WOMEN														
CLERICAL														
EQUIPMENT OPERATORS														
MECHANICS														
TRUCK DRIVERS														
IRONWORKERS														
CARPENTERS														
CEMENT MASONS														
ELECTRICIANS														
PIPEFITTERS, PLUMBERS														
PAINTERS														
LABORERS, SEMI-SKILLED														
LABORERS, UNSKILLED														
TOTAL														

Table B

APPRENTICES		ON THE JOB TRAINEES	
M	F	M	F

Table C

APPRENTICES																			
ON THE JOB TRAINEES																			

11. PREPARED BY: (Signature and Title of Contractors Representative) DATE

12. REVIEWED BY: (Signature and Title of State Highway Official) DATE

This report is required by law and regulation (23 U.S.C. 140a and 23 CFR part 230). Failure to report will result in noncompliance with this regulation.

Form PR-1391 (Rev. 3/98) PREVIOUS EDITIONS ARE OBSOLETE

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

OMB NO. 04-R2427

FEDERAL-AID HIGHWAY CONSTRUCTION

SUMMARY OF EMPLOYMENT DATA (INCLUDING MINORITY BREAKDOWN) FOR ALL FEDERAL-AID HIGHWAY PROJECTS FOR MONTH ENDING JULY 31st, 19_____

NOTE: See Instructions on REVERSE

STATE-REGION (5-8)	NUMBER OF PROJECTS (9-12)	TOTAL DOLLAR VALUE (13-23)
01		

EMPLOYMENT DATA

Table A

JOB CATEGORIES	TOTAL EMPLOYEES 9-13		14-18		TOTAL MINORITIES 19-23		24-28		BLACK *Not of Hispanic Origin* 29-33		34-38		HISPANIC 39-43		44-48		AMERICAN INDIAN OR ALASKAN NATIVE 49-53		54-58		ASIAN OR PACIFIC ISLANDER 59-63		64-68		WHITE *Not of Hispanic Origin* 69-73		74-78		APPRENTICES 79-83		84-88		ON THE JOB TRAINEES 89-93		94-98	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
02 OFFICIALS (MANAGERS)																																						
03 SUPERVISORS																																						
04 FOREMEN/WOMEN																																						
05 CLERICAL																																						
06 EQUIPMENT OPERATORS																																						
07 MECHANICS																																						
08 TRUCK DRIVERS																																						
09 IRONWORKERS																																						
10 CARPENTERS																																						
11 CEMENT MASONS																																						
12 ELECTRICIANS																																						
13 PIPEFITTERS, PLUMBERS																																						
14 PAINTERS																																						
15 LABORERS, SEMI-SKILLED																																						
16 LABORERS, UNSKILLED																																						
17 TOTAL																																						

Table B

18 APPRENTICES																																						
19 ON THE JOB TRAINEES																																						

PREPARED BY *(Signature & Title)*	DATE	REVIEWED BY *(Signature & Title of State Hwy. Official)*	DATE

This report is required by law and regulation (23 U.S.C. 140a and 23 CFR Part 230). Failure to report will result in noncompliance with this regulation.

Form PR-1392
(Rev. 3-79)

PREVIOUS EDITIONS ARE OBSOLETE

Go to Updated Editable Form QC/QA-1

FORM QC/QA-1
Revised 11/97

ALABAMA DEPARTMENT OF TRANSPORTATION
SUMMARY OF INITIAL TEST RESULTS

Project Number:	County:	Division:
Contractor:		
Pay Item Number:	Mix Number/Range:	Contract Bid Price(per Ton):

Lot Number	Tonnage Placed	Asphalt Content		Air Voids		Mat Density Pay Factor	* Referee Tests Needed?
		Number of Tests	Pay Factor	Number of Tests	Pay Factor		
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* The Department to enter Yes or No. If No, enter pay factors on QC/QA-3. If Yes, indicate which characteristic, i.e., AC(asphalt content), AV(air voids) or MD(mat density).
Example: Yes - AV. Where referee testing is required, use QC/QA-2.

Sheet No. ____ of ____

Go to Updated Editable Form QC/QA-2

FORM QC/QA-2
Revised 11/97

ALABAMA DEPARTMENT OF TRANSPORTATION
SUMMARY OF REFEREE TEST RESULTS

Project Number:	County:	Division:
Contractor:		
Pay Item Number:	Mix Number/Range:	

Lot Number	Tonnage Placed	Asphalt Content		Air Voids		Mat Density Pay Factor	* Final Comparison Satisfactory?
		Number of Tests	Pay Factor	Number of Tests	Pay Factor		
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* The Department to enter Yes or No. If No, consult AHD-380. Pay Factor to be entered on QC/QA-3 under the appropriate characteristic.

Sheet No. ____ of ____

Go to Updated Editable Form QC/QA-3

FORM QC/QA-3
Revised 11/97

ALABAMA DEPARTMENT OF TRANSPORTATION
SUMMARY OF ADJUSTED TONNAGE

Project No.:	County:	Division:
Contractor:		
Pay Item No.:	Mix Number/ESAL Range:	Contract Bid Price(per ton):

Lot Number	(1) Tonnage Placed	(2) Pay Factor Asphalt Content	(3) Pay Factor Air Voids	(4) Pay Factor Mat Density	(5) Tonnage At No Pay	(6) Adjusted Tonnage
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TOTAL	.		TOTALS		.	.

(6) = (1) x {(2)* or (3)* or (4)*}
(5) = (1) - (6)

* Apply Only the Lowest Numerical Pay Factor

Sheet No. ____ of ____

REVISED
6.16.00

NON-REIMBURSABLE AGREEMENT
FOR RELOCATION OF UTILITY FACILITIES ON PUBLIC RIGHT-OF-WAY

PROJECT NUMBER
Utilities _____
Construction _____

THIS AGREEMENT is entered into by and between the State of Alabama Department of Transportation acting by and through its Transportation Director, hereinafter referred to as the STATE, and _____ _____ hereinafter referred to as the UTILITY.

WITNESSETH:

WHEREAS, the STATE proposes a project of certain highway improvements in _____ County, Alabama, said project being designated as Project No. _____ and consisting approximately of the following: _____ _____ _____; and

WHEREAS, the UTILITY is the owner of certain facilities located on public right-of-way at places where they will interfere with the construction of said project unless said facilities are relocated; and

WHEREAS, the Transportation Director has determined that the relocation of the facilities referred to is necessitated by the construction of said project and has ordered the UTILITY to relocate same; and

WHEREAS, under the laws of Alabama, the UTILITY is required to relocate said facilities at its own expense;

NOW, THEREFORE, the parties hereto agree as follows:

1. The UTILITY will relocate its facilities presently located within the right-of-way limits of the above referenced project in accordance with the UTILITY'S plans as approved by the STATE, so as to occasion the least possible interference with the progress of the project. The UTILITY'S plans are transmitted herewith and made a part hereof by reference. The UTILITY will furnish the STATE a copy of its "as built" plans at the completion of the relocation.

2. The UTILITY will conform to the provisions of the latest edition of the State of Alabama Department of Transportation Utility Manual, as the provisions thereof are applicable hereto, for both installation and maintenance of such facilities. Such Utility Manual is of record within the Alabama Department of Transportation at the execution of this Agreement and is hereby made a part hereof by reference.

3. The UTILITY will conform to the provisions of the Federal Highway Administration Manual on Uniform Traffic Control Devices (MUTCD), latest edition, as the provisions thereof are applicable hereto, for both installation and maintenance of such facilities. Such manual is of record within the Alabama Department of Transportation at the execution of this Agreement and is hereby made a part hereof by reference.

4. Code of Federal Regulations 23 CFR 645 is hereby made a part hereof by reference and will be conformed to by the UTILITY as the provisions thereof are applicable hereto.

5. The UTILITY will observe and comply with the provisions of all Federal, State and Municipal laws and regulations as the provisions thereof are applicable hereto in the performance of work hereunder, including the Clean Water Act of 1987, the Alabama Nonpoint Source Management Program of 1989, and the regulations of the Environmental Protection Agency (EPA) and the Alabama Department of Environmental Management (ADEM). The UTILITY will procure and pay for all licenses and permits that are necessary for its performance of the work.

6. Reimbursement for future relocation of the UTILITY'S facilities will be in accordance with State law in effect at the time such relocation is made.

7. The UTILITY will be obligated for the payment of damages occasioned to private property, public utilities or the general public, caused by the legal liability (in accordance with Alabama and/or Federal law) of the UTILITY, its agents, servants, employees or facilities.

8. The UTILITY will have a copy of this Agreement on the project site at all times while work is being performed under this Agreement.

9. The UTILITY will furnish the STATE, in writing, six (6) weeks prior to the State's project letting date, a time frame for beginning and ending the required relocation work.

10. Nothing contained in this Agreement, or in its execution, shall be construed to alter or affect the title of the STATE to the public right-of-way nor to increase, decrease or modify in any way the rights of the UTILITY provided by law with respect to the construction, operation or maintenance of its facilities on the public right-of-way.

REVISED
6.16.99

SAHD No. 1
Page 3 of 3

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed by their respective officers, officials or persons thereunto duly authorized on this _____ day of _____ 19____.

WITNESS:

_____
(Legal Name of Utility)

_____

BY:_____
(Signature and Title)

APPROVED AS TO FORM:

_____
(Typed or Printed Name)

BY: _____
Mr. Jim Ippolito, Jr.
Chief Counsel,
Alabama Department of Transportation

_____
(Typed or Printed Title)

_____
(Address)

RECOMMENDED FOR APPROVAL:

_____
(Telephone)

BY:_____
Division Engineer

STATE OF ALABAMA DEPARTMENT OF TRANSPORTATION
ACTING BY AND THROUGH ITS TRANSPORTATION DIRECTOR

BY: _____
Utility Engineer

BY:_____
Transportation Director

REIMBURSABLE AGREEMENT FOR RELOCATION OF UTILITY FACILITIES ON PRIVATE OR PUBLIC RIGHT-OF-WAY

PROJECT NUMBER

____ Private Right-of-Way Utilities _____

____ Public Right-of-Way Construction _____

THIS AGREEMENT is entered into by and between the State of Alabama Department of Transportation acting by and through its Transportation Director, hereinafter referred to as the STATE, and _____ _____, hereinafter referred to as the UTILITY.

WITNESSETH:

WHEREAS, the STATE proposes a project of certain highway improvements in _____ County, Alabama, said project being designated as Project No. _____ and consisting approximately of the following: _____ _____ _____ ; and

WHEREAS, the UTILITY is the owner of certain facilities located on private or public right-of-way, as applicable, at places where they will interfere with the construction of said project unless said facilities are relocated; and

WHEREAS, the Transportation Director has determined that the relocation of the facilities hereinafter referred to is necessitated by the construction of said project and has requested or ordered, as applicable, the UTILITY to relocate same; and

WHEREAS, under the laws of Alabama, the STATE is required to compensate the UTILITY for all or part of such relocation;

NOW, THEREFORE, the parties hereto agree as follows:

1. The UTILITY will relocate its facilities presently located within the right-of-way limits of the above referenced project in accordance with the UTILITY'S plans and specifications as approved by the STATE, so as to occasion the least possible interference with the progress of the project. The UTILITY'S plans, specifications and estimate of relocation cost are transmitted herewith and made a part hereof by reference.

2. The estimated cost for Engineering required by the relocation of utility facilities will be included in the the total estimated cost of relocation set forth hereafter in this Agreement, and will be divided into three (3) phases: (a) Phase I - Concept; (b) Phase II - Design; and (c) Phase III - Construction. Each Phase of the Engineering work must be estimated and performed independently of the other. The three Engineering Phases will apply to work performed by the UTILITY'S Engineering Personnel and/or Consultant Engineers. The UTILITY will not proceed with any

additional Phase of the required engineering work until it has received written notification from the STATE approving the completion of the previous Phase and written instruction to proceed with the next Phase.

3. The STATE has the right to notify the UTILITY, in writing, to cease Engineering work at any time it deems necessary. If so notified, the UTILITY shall cause all work to cease within four (4) working days and will invoice the STATE for the reimbursable work completed to date.

4. The UTILITY will conform to the provisions of the latest edition of the State of Alabama Department of Transportation Utility Manual, as the provisions thereof are applicable hereto, for both installation and maintenance of such facilities. Such Utility Manual is of record within the Alabama Department of Transportation at the execution of this Agreement and is hereby made a part hereof by reference.

5. The UTILITY will conform to the provisions of the Federal Highway Administration Manual on Uniform Traffic Control Devices (MUTCD), latest edition, as the provisions thereof are applicable hereto, for both installation and maintenance of such facilities. Such manual is of record within the Alabama Department of Transportation at the execution of this Agreement and is hereby made a part hereof by reference.

6. Code of Federal Regulations 23 CFR 645 is hereby made a part hereof by reference and will be conformed to by the UTILITY as the provisions thereof are applicable hereto.

7. The UTILITY will observe and comply with the provisions of all Federal, State and Municipal laws and regulations as the provisions thereof are applicable hereto in the performance of work hereunder, including the Clean Water Act of 1987, the Alabama Nonpoint Source Management Program of 1989, and the regulations of the Environmental Protection Agency (EPA) and the Alabama Department of Environmental Management (ADEM). The UTILITY will procure and pay for all licenses and permits that are necessary for its performance of the work.

8. The UTILITY will perform the work of relocation: (a)_____ by UTILITY'S own forces; (b) _____ by contract let by the UTILITY; (c) _____ by an existing written continuing contract where the work is regularly performed for the UTILITY; or (d) _____ by combination of the preceding (as shown in detail on the estimate).

9. The detailed relocation cost estimate will be prepared on the State's Form U-10 or the UTILITY'S own form giving the same type of information and attached to this agreement. With respect to facilities located on the UTILITY'S private right-of-way, the STATE will reimburse the UTILITY for the actual cost of relocation, as may be adjusted below. With respect to facilities located on public right-of-way, the STATE will reimburse the UTILITY for all or part of the actual cost of relocation as required by the laws of Alabama, as may be adjusted below.

a. The STATE'S share of the engineering charges shall be limited to the "in-kind" work only.

b. The total actual cost of relocation, including Engineering, whether the facilities are on private or public right-of-way, shall be adjusted for betterment, if any, as defined and provided for in 23 CFR 645 above noted. Excluding betterment costs, the total estimated cost of relocation, including Engineering, is $_____. The total estimated cost including betterment is $_____.

c. If an adjustment for betterment is applicable, the STATE will reimburse the UTILITY for _____ percent of the actual cost of relocation and the remaining _____ percent thereof shall be for the account of the UTILITY for betterment. If there are changes during construction and/or the actual construction cost percentage becomes substantially different from the construction estimate, the STATE reserves the right to recalculate the percentages at any time.

10. The method to be used for the development of relocation costs for this project is: (a) _____ as established by Federal or State regulatory body; (b) _____ as previously approved by the STATE; or (c) _____ Lump Sum Amount ($100,000 maximum). The UTILITY will furnish the STATE, in writing, six (6) weeks prior to the State's project letting date a time frame for beginning and ending the required relocation work.

11. The UTILITY will keep accurate and true records of all expenditures made by it in the process of such relocation. Records will be kept in accordance with 23 CFR 645 above noted, or in accordance with Part 30 and 31, Federal Acquisition Regulations, or in accordance with accounting practices acceptable to the STATE.

12. The UTILITY will, during the progress of the work and for three years from the date final payment is made, make its records available during normal working hours for examination and audit by representatives of the STATE and of the Federal Highway Administration to verify amounts and items covered in the reimbursement for relocation of facilities covered herein. Said records will be available for examination at

_____

_____

_____

_____.

13. The UTILITY will, within six (6) months following completion of the relocation, furnish the STATE such papers, records, supporting documents and invoices as may be required by the State showing the cost of said relocation. The UTILITY will furnish the STATE a copy of its "as built" plans for the STATE'S records.

14. Upon receipt of such documents and accounts as may be required by the preceding paragraph and upon completion and acceptance of such verification as the STATE may deem necessary, the STATE will reimburse the UTILITY for the actual cost of such relocation as verified by the STATE. In the event the actual verified cost, as accepted, exceeds the estimated cost, the STATE may require a Supplemental Agreement to be executed between the parties prior to reimbursement of any amount in excess of the estimated cost.

15. Paragraphs numbered 16 through 20 set forth below are applicable to this Agreement only if some or all of the UTILITY facilities to be relocated hereunder are located on private right-of-way of the UTILITY; otherwise, such paragraphs are considered inapplicable to this Agreement and null and void.

16. Where the UTILITY has a compensable property interest in its existing location (herein referred to as private right-of-way) by reason of holding the fee, an easement or other property interest, evidence of such compensable property interest will be submitted to the STATE by the UTILITY for review and approval.

17. If the UTILITY is required to move all of its facilities from a portion of its private right-of-way, upon completion of the relocation provided for herein, the UTILITY will convey to the STATE by Quitclaim Deed the portion of its private right-of-way located within the right-of-way limits of the above referenced project.

18. In the event the UTILITY is not required to relocate any of its facilities which are located on its private right-of-way, the following provisions shall apply:

a. To the extent the UTILITY has the right to so agree the STATE will have the right to construct, operate and maintain a highway over and along the portion of the UTILITY'S private right-of-way located within the right-of-way limits of the above referenced project.

b. The subordination of the UTILITY'S private right-of-way to the right of the STATE to construct, operate, and maintain said highway will be effective and operative only to such air, surface and sub-surface rights as may reasonably be required and are necessary for the construction, operation, and maintenance of said highway, and to enable the STATE to control access to the highway where such control is established; otherwise this subordination agreement will in no wise affect and impair the rights of the UTILITY, its successors and assigns, in or to its private right-of-way, including but not limited to the right to install additional facilities over, under and across the highway; provided, however, that any installation of additional facilities will be subject to the STATE'S responsibility and right

to make prior determination that any such additional facilities are located so as not to impair the highway or any planned highway improvement and so as not to interfere with the free and safe flow of traffic thereon.

c. It is mutually understood that the terms of this Agreement do not subordinate, affect or impair the rights of the UTILITY for reimbursement of the cost of such future relocation as may be required and necessitated by highway construction at some future date, as fully as if no subordination existed; however, such relocation will be in accordance with an additional agreement to be entered into at that time between the UTILITY and the STATE.

19. If the UTILITY is required to relocate any of its facilities which are located on its private right-of-way to a new location on the same private right-of-way, the following provisions shall apply:

a. To the extent the UTILITY has the right to so agree, upon completion of the relocation provided for herein, the STATE will have the right to construct, operate and maintain a highway over and along the portion of the UTILITY'S private right-of-way located within the right-of-way limits of the above referenced project.

b. The subordination of the UTILITY'S private right-of-way to the right of the STATE to construct, operate and maintain said highway will be effective and operative only to such air, surface and sub-surface rights as may reasonably be required and are necessary for the construction, operation and maintenance of said highway, and to enable the STATE to control access to the highway where such control is established; otherwise this subordination agreement will in no wise affect and impair the rights of the UTILITY, its successors and assigns, in or to its private right-of-way, including but not limited to the right to install additional facilities over, under and across the highway; provided, however, that any installation of additional facilities will be subject to the STATE'S responsibility and right to make prior determination that any such additional facilities are located so as not to impair the highway or any planned highway improvement and so as not to interfere with the free and safe flow of traffic thereon.

c. It is mutually understood that the terms of this Agreement do not subordinate, affect or impair the rights of the UTILITY for reimbursement of the cost of such future relocation as may be required and necessitated by highway construction at some future date, as fully as if no subordination existed; however, such relocation will be in accordance with an additional agreement to be entered into at that time between the UTILITY and the STATE.

20. If the UTILITY is required to relocate any of its facilities which are located on its private right-of-way to a new location on public right-of-way or if any such facilities are to be retained in place within the public right-of-way due to this project, the following provisions will apply:

a. The cost of relocation will include reimbursement for acquisition of right-of-way by the UTILITY to place necessary guy wires and anchors on private lands adjacent to the highway right-of-way and the rights to cut, trim and remove, initially and from time to time as necessary, trees on private lands adjacent to the highway right-of-way which might then or thereafter endanger the facilities of the UTILITY.

b. Reimbursement for future relocation of the UTILITY'S facilities will be in accordance with State laws in effect at the time such relocation is made; provided, however, the UTILITY will be reimbursed for the cost of any future relocation of the facilities, including the cost of acquisition of equivalent private right-of-way if such future relocation is outside the highway right-of-way and such relocation is required by the STATE, and provided that the prior relocation from private right-of-way to public right-of-way was without compensation to the UTILITY for its compensable property interest in its private right-of-way.

21. The UTILITY will be obligated for the payment of damages occasioned to private property, public utilities or the general public, caused by the legal liability (in accordance with Alabama and/or Federal law) of the UTILITY, its agents, servants, employees or facilities.

22. In the event a Utility - Consultant Engineering Agreement for this project is entered into between the UTILITY and a Consulting Engineer, the following provisions will apply:

a. The UTILITY has complied or will comply with and fulfill and will require the Consultant Engineer of the UTILITY to comply with and fulfill, all obligations, requirements, notifications, and provisions of the Utility - Consultant Engineering Agreement executed for this project work which are for the benefit or protection of the STATE.

b. The UTILITY has obtained or will obtain all approvals and authorizations required by the STATE which are provided for in the Utility - Consultant Engineering Agreement.

c. No reimbursement payments will be due and none will be made by the STATE until such Utility - Consultant Engineering Agreement is complied with faithfully by the UTILITY and Consulting Engineer.

23. The UTILITY will have a copy of this Agreement on the project site at all times while work is being performed under this Agreement.

24. Nothing contained in this Agreement, or in its execution, shall be construed to alter or affect the title of the STATE to the public right-of-way nor to increase, decrease or modify in any way the rights of the UTILITY provided by law with respect to the construction, operation or maintenance of its facilities on the public right-of-way.

25. Paragraph 26 set forth below is applicable to this Agreement only if Federal appropriated funds are available or will be available in the project by which the relocation required by this Agreement is necessitated.

26. In the event any Federal Funds are utilized for this work, the following certification is made:

The undersigned certifies, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

27. Exhibit N is attached hereto and made a part hereof.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed by their respective officers, officials and persons thereunto duly authorized, and the agreement is deemed to be dated and to be effective on the date hereinafter stated as the date of its approval by the Governor of Alabama.

WITNESS: _____

APPROVED AS TO FORM:

_____
(Legal Name of Utility)

BY: _____
Jim Ippolito, Jr.
Chief Counsel,
Alabama Department of Transportation

BY: _____
(Signature and Title)

To the best of my knowledge this document complies with the laws, rules, and regulations of the State of Alabama.

_____
(Typed Name)

RECOMMENDED FOR APPROVAL:

_____
(Typed Title)

BY: _____

_____
(Address)

_____
(Typed Name)
Division Engineer

_____
(Telephone)

BY: _____
Robert G. Lee
Utilities Engineer

STATE OF ALABAMA DEPARTMENT OF
TRANSPORTATION ACTING BY AND
THROUGH ITS TRANSPORTATION DIRECTOR

_____
G. M. Roberts
Transportation Director

The within and foregoing Agreement is hereby approved on this ____ day of _____, 19___.

_____
Don Siegelman
GOVERNOR
STATE OF ALABAMA

EXHIBIT N

FUNDS SHALL NOT BE CONSTITUTED AS A DEBT

It is agreed that the terms and commitments contained herein shall not be constituted as a debt of the State of Alabama in violation of Article 11, Section 213 of the Constitution of Alabama, 1901, as amended by Amendment Number 26. It is further agreed that if any provision of this agreement shall contravene any statue or Constitutional provision of amendment, either now in effect or which may, during the course of this agreement, be enacted, then the conflicting provision in the agreement shall be deemed null and void.

TERMINATION DUE TO INSUFFICIENT FUNDS

a. If the agreement term is to exceed more than one fiscal year, then said agreement is subject to termination in the event that funds should not be appropriated for the continued payment of the agreement in subsequent fiscal years.

b. In the event of proration of the fund from which payment under this agreement is to be made, agreement will be subject to termination.

REVISED
6 16 00

SAHD No. 3
Page 1 of 5

REIMBURSABLE AGREEMENT FOR RELOCATION OF UTILITY FACILITIES ON PRIVATE OR PUBLIC RIGHT-OF-WAY WORK TO BE PERFORMED BY STATE CONTRACTOR

PROJECT NUMBER

____ Private Right-of-Way Utilities _____

____ Public Right-of-Way Construction _____

THIS AGREEMENT is entered into by and between the State of Alabama Department of Transportation acting by and through its Transportation Director, hereinafter referred to as the STATE, and _____ _____, hereinafter referred to as the UTILITY.

WITNESSETH:

WHEREAS, the STATE proposes a project of certain highway improvements in _____ County, Alabama, said project being designated as Project No. _____ and consisting approximately of the following: _____ _____ _____ ; and

WHEREAS, the UTILITY is the owner of certain facilities located on private or public right-of-way, as applicable, at places where they will interfere with the construction of said project unless said facilities are relocated; and

WHEREAS, the Transportation Director has determined that the relocation of the facilities hereinafter referred to is necessitated by the construction of said project and has requested or ordered, as applicable, the UTILITY to relocate same; and

WHEREAS, under the laws of Alabama, the STATE is required to compensate the UTILITY for all or part of such relocation;

NOW, THEREFORE, the parties hereto agree as follows:

1. The UTILITY, not being staffed or equipped to perform the relocation, requests that the relocation work be included in the STATE'S Highway Construction Contract. The relocation of the facilities will be accomplished in accordance with and as shown by the UTILITY'S reproducible mylar plans, specifications, and estimate transmitted herewith and made a part hereof by reference. The estimated cost of the "In-Kind" relocation including engineering is $_____.

a. The actual cost of relocation will not be reimbursed to the UTILITY but will be paid directly to the STATE'S contractor by the STATE as a part of its contract.

b. In the event a Consultant Engineer acceptable to and approved by the STATE is utilized by the UTILITY, the actual cost of such Engineer under contract approved by the STATE will be reimbursed by the STATE to the UTILITY. If the UTILITY, with approval of the STATE, designs the relocation work with company employees, the STATE will reimburse the UTILITY for the actual cost of such design. Payment for actual cost in either instance will be made upon receipt and verification of appropriate invoices from the UTILITY provided the actual cost is established by the records of the UTILITY when kept in accordance and in compliance with general accounting practices acceptable to the STATE and in compliance with Parts 30 and 31, Federal Acquisition Regulations.

The detailed cost estimate will be prepared on the State's Form U-10 or the UTILITY'S own form giving the same type of information. The estimated cost for Engineering required by the relocation of utility facilities is included in the total estimated cost of relocation set forth hereafter in this Agreement, and will be divided into three (3) phases: (a) Phase I - Concept; (b) Phase II - Design; and (c) Phase III - Construction. Each Phase of the Engineering work must be estimated and performed independently of the other. The three Engineering Phases will apply to work performed by the UTILITY'S Engineering Personnel and/or Consultant Engineers. The UTILITY will not proceed with any additional Phase of the required engineering work until it has received written notification from the STATE approving the completion of the previous Phase and written instruction to proceed with the next Phase.

The STATE has the right to notify the UTILITY, in writing, to cease Engineering work at any time it deems necessary. If so notified, the UTILITY shall cause all work to cease within four (4) working days and will invoice the STATE for the reimbursable work completed to date.

The STATE'S share of the engineering charges shall be limited to the "in-kind" work only.

c. ___ If the relocation plan contains betterment, the foregoing blank will by checked. Two (2) estimates will be required, an "in-kind" and a "betterment" estimate. After opening of bids in accordance with 23 CFR 635 and applicable State law and prior to award of the STATE'S Contract, the STATE will invoice the UTILITY for the low-bid Contractor's price for the betterment items. This invoice will be paid by the Utility prior to contract award, or the "betterment" items will be deleted from the contract and it may be awarded without betterment. At the completion of the project, a final accounting will be held. At this time any funds due the UTILITY will be returned or if funds are due the STATE, the UTILITY will be sent a Final Invoice for the amount due and the UTILITY will promptly pay such amount to the STATE.

The total actual cost of relocation, whether the facilities are on private or public right-of-way, shall be adjusted for betterment, if any, as defined and provided for in 23 CFR 645. Excluding betterment costs, the total estimated cost of relocation, including Engineering is $_____. The total estimated cost including betterment is $_____.

If an adjustment for betterment is applicable, the STATE shall reimburse the UTILITY based on the percentage ratio of "in-kind" cost and "betterment" cost and being _____ percent of the total actual cost of relocation, as "in-kind", and the remaining _____ percent thereof shall be for the account of the UTILITY for betterment. If there are changes during construction and/or the actual construction cost percentage becomes substantially different from the construction estimate, the STATE reserves the right to recalculate the percentages at any time.

2. The UTILITY will conform to the provisions of the latest edition of the State of Alabama Department of Transportation Utility Manual, as the provisions thereof are applicable hereto, for both installation and maintenance of such facilities. Such Utility Manual is of record within the Alabama Department of Transportation at the execution of this Agreement and is hereby made a part hereof by reference.

3. The UTILITY will conform to the provisions of the Federal Highway Administration Manual on Uniform Traffic Control Devices (MUTCD), latest edition, as the provisions thereof are applicable hereto, for both installation and maintenance of such facilities. Such manual is of record within the Alabama Department of Transportation at the execution of this Agreement and is hereby made a part hereof by reference.

4. The UTILITY will be notified by the STATE Project Engineer, twenty-four (24) hours in advance of the commencement of the facility adjustment by the STATE Contractor. The STATE Project Engineer shall have final authority in all matters affecting the work of the STATE'S Contractor. In the event the UTILITY has an Inspector on the project, such Inspector will not issue any instructions to the STATE'S Contractor. All instructions to the STATE'S Contractor with regard to the work provided for under this agreement will be issued by the STATE Project Engineer, after consultation with the UTILITY Inspector or Representative if found necessary by the STATE Project Engineer.

5. Code of Federal Regulations 23 CFR 645 is hereby made a part hereof by reference and will be conformed to by the UTILITY as the provisions thereof are applicable hereto.

6. The UTILITY will observe and comply with the provisions of all Federal, State and Municipal laws and regulations as the provisions thereof are applicable hereto in the performance of work hereunder, including the Clean Water Act of 1987, the Alabama Nonpoint Source Management Program of 1989, and the regulations of the Environmental Protection Agency (EPA) and the Alabama Department of Environmental Management (ADEM). The UTILITY will procure and pay for all licenses and permits that are necessary for its performance of the work.

7. Where the UTILITY has a compensable property interest in its existing location (herein referred to as private right-of-way) by reason of holding the fee, an easement or other property interest, evidence of such compensable property interest will be submitted to the STATE by the UTILITY for review and approval.

8. If the UTILITY is required to move all of its facilities from a portion of its private right-of-way, upon completion of the relocation provided for herein, the UTILITY will convey to the STATE by Quitclaim Deed the portion of its private right-of-way located within the right-of-way limits of the above referenced project.

9. In the event the UTILITY is required to relocate any of its facilities which are located on its private right-of-way to a new location on public right-of-way or if any such facilities are to be retained in place within the public right-of-way due to this project, the following provisions will apply:

a. The cost of relocation will include reimbursement for acquisition of right-of-way by the UTILITY to place necessary guy wires and anchors on private lands adjacent to the highway right-of-way and the rights to cut, trim and remove, initially and from time to time as necessary, trees on private lands adjacent to the highway right-of-way which might then or thereafter endanger the facilities of the UTILITY.

b. Reimbursement for future relocation of the UTILITY'S facilities will be in accordance with State law in effect at the time such relocation is made; provided, however, the UTILITY will be reimbursed for the cost of any future relocation of the facilities, including the cost of acquisition of equivalent private right-of-way if such future relocation is outside the highway right-of-way and such relocation is required by the STATE, and provided that the prior relocation from private right-of-way to public right-of-way was without compensation to the UTILITY for its compensable property interest in its private right-of-way.

10. The UTILITY will be obligated for the payment of damages occasioned to private property, public utilities or the general public, caused by the legal liability (in accordance with Alabama and/or Federal law) of the UTILITY, its agents, servants, employees or facilities.

11. In the event a Utility - Consultant Engineering Agreement for this project is entered into between the UTILITY and a Consulting Engineer, the following provisions will apply:

a. The UTILITY has complied or will comply with and fulfill all obligations, requirements, notifications, and provisions of the Utility - Consultant Engineering Agreement executed for this project work which are for the benefit or protection of the STATE.

b. The UTILITY has obtained or will obtain all approvals and authorizations required by the STATE which are provided for in the Utility - Consultant Engineering Agreement.

c. No reimbursement payments will be due and none will be made by the STATE until such Utility - Consultant Engineering Agreement is complied with faithfully by the UTILITY and Consulting Engineer.

12. Nothing contained in this Agreement, or in its execution, shall be construed to alter or affect the title of the STATE to the public right-of-way nor to increase, decrease or modify in any way the rights of the UTILITY provided by law with respect to the construction, operation or maintenance of its facilities on the public right-of-way.

13. Paragraph 14 set forth below is applicable to this Agreement only if Federal appropriated funds are available or will be available in the project by which the relocation required by this Agreement is necessitated.

14. In the event any Federal Funds are utilized for this work, the following certification is made:

The undersigned certifies, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

15. Exhibit N is attached hereto and made a part of hereof.

REVISED
6 16 00

SAHD No. 3
Page 5 of 5

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed by their respective officers, officials and persons thereunto duly authorized, and the agreement is deemed to be dated and to be effective on the date hereinafter stated as the date of its approval by the Governor of Alabama.

WITNESS: _____

APPROVED AS TO FORM:

BY: _____

Jim Ippolito, Jr.
Chief Counsel,
Alabama Department of Transportation

To the best of my knowledge this document complies with the laws, rules, and regulations of the State of Alabama.

RECOMMENDED FOR APPROVAL:

BY: _____

_____
(Typed Name)
Division Engineer

BY: _____
Robert G. Lee
Utilities Engineer

STATE OF ALABAMA DEPARTMENT OF TRANSPORTATION ACTING BY AND THROUGH ITS TRANSPORTATION DIRECTOR

_____
G. M. Roberts
Transportation Director

_____
(Legal Name of Utility)

BY: _____
(Signature and Title)

_____
(Typed Name)

_____
(Typed Title)

_____
(Address)

_____
(Telephone)

The within and foregoing Agreement is hereby approved on this _____ day of _____, 19___.

_____
Don Siegelman
GOVERNOR
STATE OF ALABAMA

EXHIBIT N

FUNDS SHALL NOT BE CONSTITUTED AS A DEBT

It is agreed that the terms and commitments contained herein shall not be constituted as a debt of the State of Alabama in violation of Article 11, Section 213 of the Constitution of Alabama, 1901, as amended by Amendment Number 26. It is further agreed that if any provision of this agreement shall contravene any statue or Constitutional provision of amendment, either now in effect or which may, during the course of this agreement, be enacted, then the conflicting provision in the agreement shall be deemed null and void.

TERMINATION DUE TO INSUFFICIENT FUNDS

a. If the agreement term is to exceed more than one fiscal year, then said agreement is subject to termination in the event that funds should not be appropriated for the continued payment of the agreement in subsequent fiscal years.

b. In the event of proration of the fund from which payment under this agreement is to be made, agreement will be subject to termination.

NON-REIMBURSABLE AGREEMENT FOR RELOCATION OF UTILITY FACILITIES ON PUBLIC RIGHT-OF-WAY WORK TO BE DONE BY STATE CONTRACTOR

PROJECT NUMBER

Utilities _____

Construction _____

THIS AGREEMENT is entered into by and between the Alabama Department of Transportation acting by and through its Transportation Director, hereinafter referred to as the STATE, and _____ _____, hereinafter referred to as the UTILITY.

WITNESSETH:

WHEREAS, the STATE proposes a project of certain highway improvements in _____ County, Alabama, said project being designated as Project No. _____ and consisting approximately of the following: _____ _____ _____ ; and

WHEREAS, the UTILITY is the owner of certain facilities located on public right-of-way at places where they will interfere with the construction of said project unless said facilities are relocated; and

WHEREAS, the Transportation Director has determined that the relocation of the facilities hereinafter referred to is necessitated by the construction of said project and has ordered, the UTILITY to relocate same; and

WHEREAS, under the laws of Alabama, the UTILITY is required to relocate said facilities at its own expense;

NOW, THEREFORE, the parties hereto agree as follows:

1. The UTILITY has requested that the relocation work herein above referred to, be performed by the STATE'S Contractor in order to avoid potential conflicts within the limited working area of the project. The relocation, subject to payment to be made as hereinafter provided, will be included in the STATE'S Contract and the work performed by the STATE'S Contractor. The relocation of the facilities will be accomplished in conformance with and to the reproducible mylar plans and the detailed estimate for the work developed by the UTILITY and approved by the STATE, which plans are incorporated in and made a part hereof by reference. The estimated cost of the relocation is $ _____ as shown in detail on the attached detailed estimate.

2. The relocation work will consist primarily of the adjustment of manhole covers and valve boxes or similar work near the paving surface. This adjustment work will also be accomplished in accordance with the latest edition of the Alabama Department of Transportation Standard Specifications for Highway Construction, designated State of Alabama Highway Department Standard Specifications for Highway Construction, which Specifications are of record in the Alabama Department of Transportation and are hereby made a part hereof by reference, and to be applied to the work as applicable.

3. The UTILITY will conform to the provisions of the latest edition of the State of Alabama Department of Transportation Utility Manual, as the provisions thereof are applicable hereto, for both installation and maintenance of such facilities. Such Utility Manual is of record within the Alabama Department of Transportation at the execution of this Agreement and is hereby made a part hereof by reference.

4. The UTILITY will conform to the provisions of the Federal Highway Administration Manual on Uniform Traffic Control Devices (MUTCD), latest edition, as the provisions thereof are applicable hereto, for both installation and maintenance of such facilities. Such manual is of record within the Alabama Department of Transportation at the execution of this Agreement and is hereby made a part hereof by reference.

5. The engineering layout of all work if required will be the responsibility of the STATE, in keeping with its usual procedures.

6. The UTILITY will pay the STATE as hereinafter provided all cost for the utility facility adjustment to be performed by the STATE at the cost and expense of the UTILITY, based on bid prices accepted by the STATE.

7. With respect to the adjustment to be accomplished, the following provisions will be applicable to the letting, contract award and payment:

a. The STATE will notify the UTILITY in advance of the date that bids will be opened for construction of the project.

b. Following receipt of bids, the STATE will tabulate the bids and furnish the UTILITY, in writing, the result of the bidding and invoice the UTILITY for the sum of the acceptable prices bid for the adjustment items of work listed in the proposal.

c. Within ten (10) calendar days following receipt of notification of bid results, the UTILITY will pay to the Alabama Department of Transportation the total sum of the invoiced bid price for the adjustment of utility facilities. This payment will be made by bank cashier check to the State of Alabama. These funds will be used by the STATE'S normal practices and procedures.

d. The items of work for which the UTILITY is responsible for payment are estimated quantities only. The STATE will monitor or inventory the work from time to time for which the UTILITY is responsible, and again at the completion of the project. If it is determined that the total units of work are less than that estimated, the STATE will make restitution to the UTILITY in the amount of money due the UTILITY for the lesser units of work based on unit cost; conversely, if it is determined that the total units of work exceed the estimated units, the STATE will invoice the UTILITY accordingly and the Utility will promptly pay to the STATE the amount of the increased cost determined to be payable based on unit cost.

8. Following tabulation of the bids received by the STATE and the notification to the UTILITY of the amount due for the adjustment work to be performed by the STATE at the cost and expense of the UTILITY, and upon receipt of an aforementioned check from the UTILITY to the STATE for the work as above provided, including the work provided for as utility adjustment, the award of a contract, for the project, will be made.

a. In the event the STATE is not in receipt of the correct amount of money due from the UTILITY prior to contract award for the adjustment work provided for in this agreement to be performed by the STATE at the cost and expense of the UTILITY, such work will be deleted by the STATE from the contract award for the project construction, and the contract will be awarded by the STATE without the adjustment work. No liability will arise against the STATE as a result of such deletion.

b. In the event the STATE'S invoice, based on the bid tabulation is unacceptable to the UTILITY, the UTILITY shall so notify the STATE in writing within (10) days of notice to it of the bid amount; or in the event the UTILITY fails to pay the STATE the bid price amount due from it prior to time for contract award, the UTILITY will adjust its facilities with either its Utility Forces or by the utilization of Contract Forces (other than the STATE'S Contract Forces) which are available to the UTILITY. The UTILITY will coordinate this adjustment work with the STATE'S Contractor.

c. All other utility facilities owned by the UTILITY, which are not in conflict with construction of the STATE'S project will be retained in place and no separate agreement will be required for such retention.

9. The UTILITY will be notified by the STATE Project Engineer, twenty-four (24) hours in advance of the commencement of the facility adjustment by the STATE Contractor. The STATE Project Engineer shall have final authority in all matters affecting the work of the STATE'S Contractor. In the event the UTILITY has an Inspector on the project, such Inspector will not issue any instructions to the STATE'S Contractor. All instructions to the STATE'S Contractor with regard to the work provided for under this agreement will be issued by the STATE Project Engineer, after consultation with the UTILITY Inspector or Representative if found necessary by the STATE Project Engineer.

10. Reimbursement for future relocation of the UTILITY'S facilities will be in accordance with State law in effect at the time such relocation is made.

11. The UTILITY will be obligated for the payment of damages occasioned to private property, public utilities or the general public, caused by the legal liability (in accordance with Alabama and/or Federal law) of the UTILITY, its agents, servants, employees or facilities.

12. Nothing contained in this Agreement, or in its execution, shall be construed to alter or affect the title of the STATE to the public right-of-way nor to increase, decrease or modify in any way the rights of the UTILITY provided by law with respect to the construction, operation or maintenance of its facilities on the public right-of-way.

13. The Code of Federal Regulations 23 CFR 645 is hereby made a part hereof by reference and will be conformed to by the UTILITY as the provisions thereof are applicable hereto.

14. The UTILITY will observe and comply with the provisions of all Federal, State and Municipal laws and regulations as the provisions thereof are applicable hereto in the performance of work hereunder, including the Clean Water Act of 1987, the Alabama Nonpoint Source Management Program of 1989, and the regulations of the Environmental Protection Agency (EPA) and the Alabama Department of Environmental Management (ADEM). The UTILITY will procure and pay for all licenses and permits that are necessary for its performance of the work.

REVISED
6-16-99

SAHD No. 4
Page 4 of 5

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed by their respective officers, officials and persons thereunto duly authorized, and the agreement is deemed to be dated and to be effective on the date hereinafter stated as the date of its approval by the Governor of Alabama.

WITNESS: _____

APPROVED AS TO FORM:

BY: _____

Jim Ippolito, Jr.
Chief Counsel,
Alabama Department of Transportation

To the best of my knowledge this document complies with the laws, rules, and regulations of the State of Alabama.

RECOMMENDED FOR APPROVAL:

BY: _____

_____
(Typed Name)
Division Engineer

BY: _____
Robert G. Lee
Utilities Engineer

STATE OF ALABAMA DEPARTMENT OF
TRANSPORTATION ACTING BY AND
THROUGH ITS TRANSPORTATION DIRECTOR

_____
G. M. Roberts
Transportation Director

_____
(Legal Name of Utility)

BY: _____
(Signature and Title)

_____
(Typed Name)

_____
(Typed Title)

_____
(Address)

_____
(Telephone)

The within and foregoing Agreement is hereby approved on this_____ day of _____, 19___.

_____
Don Siegelman
GOVERNOR
STATE OF ALABAMA

REVISED
6.16.00

SAHD No. 4
Page 5 of 5

DETAILED ESTIMATE

1. The Utility desires to be notified twenty-four (24) hours in advance of the State's Contractor beginning work.

   _____ Yes _____ No

2. The Utility will have an Inspector on the project, during operations affecting the Utility.

   _____ Yes _____ No

3.

ITEM NO.	UNIT	EST. COST PER UNIT	QUANTITY	DESCRIPTION	TOTAL EST. COST/ITEM

Total Estimated Cost _____
(Enter here and on the Agreement form)

REVISED
6-16-99

SAHD No. 4
Page 1 of 5

NON-REIMBURSABLE AGREEMENT FOR RELOCATION OF UTILITY FACILITIES ON PUBLIC RIGHT-OF-WAY WORK TO BE DONE BY STATE CONTRACTOR

REVISED

PROJECT NUMBER

Utilities _____

Construction _____

THIS AGREEMENT is entered into by and between the Alabama Department of Transportation acting by and through its Transportation Director, hereinafter referred to as the STATE, and _____ _____, hereinafter referred to as the UTILITY.

WITNESSETH:

WHEREAS, the STATE proposes a project of certain highway improvements in _____ County, Alabama, said project being designated as Project No. _____ and consisting approximately of the following: _____ _____ _____ ; and

WHEREAS, the UTILITY is the owner of certain facilities located on public right-of-way at places where they will interfere with the construction of said project unless said facilities are relocated; and

WHEREAS, the Transportation Director has determined that the relocation of the facilities hereinafter referred to is necessitated by the construction of said project and has ordered, the UTILITY to relocate same; and

WHEREAS, under the laws of Alabama, the UTILITY is required to relocate said facilities at its own expense;

NOW, THEREFORE, the parties hereto agree as follows:

1. The UTILITY has requested that the relocation work herein above referred to, be performed by the STATE'S Contractor in order to avoid potential conflicts within the limited working area of the project. The relocation, subject to payment to be made as hereinafter provided, will be included in the STATE'S Contract and the work performed by the STATE'S Contractor. The relocation of the facilities will be accomplished in conformance with and to the reproducible mylar plans and the detailed estimate for the work developed by the UTILITY and approved by the STATE, which plans are incorporated in and made a part hereof by reference. The estimated cost of the relocation is $ _____ as shown in detail on the attached detailed estimate.

2. The relocation work will consist primarily of the adjustment of ~~manhole covers and valve boxes~~ WATER MAIN RELOCATION or similar work near the paving surface. This adjustment work will also be accomplished in accordance with the latest edition of the Alabama Department of Transportation Standard Specifications for Highway Construction, designated State of Alabama Highway Department Standard Specifications for Highway Construction, which Specifications are of record in the Alabama Department of Transportation and are hereby made a part hereof by reference, and to be applied to the work as applicable.

3. The UTILITY will conform to the provisions of the latest edition of the State of Alabama Department of Transportation Utility Manual, as the provisions thereof are applicable hereto, for both installation and maintenance of such facilities. Such Utility Manual is of record within the Alabama Department of Transportation at the execution of this Agreement and is hereby made a part hereof by reference.

4. The UTILITY will conform to the provisions of the Federal Highway Administration Manual on Uniform Traffic Control Devices (MUTCD), latest edition, as the provisions thereof are applicable hereto, for both installation and maintenance of such facilities. Such manual is of record within the Alabama Department of Transportation at the execution of this Agreement and is hereby made a part hereof by reference.

5. The engineering layout of all work if required will be the responsibility of the STATE, in keeping with its usual procedures.

6. The UTILITY will pay the STATE as hereinafter provided all cost for the utility facility adjustment to be performed by the STATE at the cost and expense of the UTILITY, based on bid prices accepted by the STATE.

7. With respect to the adjustment to be accomplished, the following provisions will be applicable to the letting, contract award and payment:

a. The STATE will notify the UTILITY in advance of the date that bids will be opened for construction of the project.

b. Following receipt of bids, the STATE will tabulate the bids and furnish the UTILITY, in writing, the result of the bidding and invoice the UTILITY for the sum of the acceptable prices bid for the adjustment items of work listed in the proposal.

c. Within ten (10) calendar days following receipt of notification of bid results, the UTILITY will pay to the Alabama Department of Transportation the total sum of the invoiced bid price for the adjustment of utility facilities. This payment will be made by bank cashier check to the State of Alabama. These funds will be used by the STATE'S normal practices and procedures.

d. The items of work for which the UTILITY is responsible for payment are estimated quantities only. The STATE will monitor or inventory the work from time to time for which the UTILITY is responsible, and again at the completion of the project. If it is determined that the total units of work are less than that estimated, the STATE will make restitution to the UTILITY in the amount of money due the UTILITY for the lesser units of work based on unit cost; conversely, if it is determined that the total units of work exceed the estimated units, the STATE will invoice the UTILITY accordingly and the Utility will promptly pay to the STATE the amount of the increased cost determined to be payable based on unit cost.

8. Following tabulation of the bids received by the STATE and the notification to the UTILITY of the amount due for the adjustment work to be performed by the STATE at the cost and expense of the UTILITY, and upon receipt of an aforementioned check from the UTILITY to the STATE for the work as above provided, including the work provided for as utility adjustment, the award of a contract, for the project, will be made.

a. In the event the STATE is not in receipt of the correct amount of money due from the UTILITY prior to contract award for the adjustment work provided for in this agreement to be performed by the STATE at the cost and expense of the UTILITY, such work will be deleted by the STATE from the contract award for the project construction, and the contract will be awarded by the STATE without the adjustment work. No liability will arise against the STATE as a result of such deletion.

b. In the event the STATE'S invoice, based on the bid tabulation is unacceptable to the UTILITY, the UTILITY shall so notify the STATE in writing within (10) days of notice to it of the bid amount; or in the event the UTILITY fails to pay the STATE the bid price amount due from it prior to time for contract award, the UTILITY will adjust its facilities with either its Utility Forces or by the utilization of Contract Forces (other than the STATE'S Contract Forces) which are available to the UTILITY. The UTILITY will coordinate this adjustment work with the STATE'S Contractor.

c. All other utility facilities owned by the UTILITY, which are not in conflict with construction of the STATE'S project will be retained in place and no separate agreement will be required for such retention.

9. The UTILITY will be notified by the STATE Project Engineer, twenty-four (24) hours in advance of the commencement of the facility adjustment by the STATE Contractor. The STATE Project Engineer shall have final authority in all matters affecting the work of the STATE'S Contractor. In the event the UTILITY has an Inspector on the project, such Inspector will not issue any instructions to the STATE'S Contractor. All instructions to the STATE'S Contractor with regard to the work provided for under this agreement will be issued by the STATE Project Engineer, after consultation with the UTILITY Inspector or Representative if found necessary by the STATE Project Engineer.

10. Reimbursement for future relocation of the UTILITY'S facilities will be in accordance with State law in effect at the time such relocation is made.

11. The UTILITY will be obligated for the payment of damages occasioned to private property, public utilities or the general public, caused by the legal liability (in accordance with Alabama and/or Federal law) of the UTILITY, its agents, servants, employees or facilities.

12. Nothing contained in this Agreement, or in its execution, shall be construed to alter or affect the title of the STATE to the public right-of-way nor to increase, decrease or modify in any way the rights of the UTILITY provided by law with respect to the construction, operation or maintenance of its facilities on the public right-of-way.

13. The Code of Federal Regulations 23 CFR 645 is hereby made a part hereof by reference and will be conformed to by the UTILITY as the provisions thereof are applicable hereto.

14. The UTILITY will observe and comply with the provisions of all Federal, State and Municipal laws and regulations as the provisions thereof are applicable hereto in the performance of work hereunder, including the Clean Water Act of 1987, the Alabama Nonpoint Source Management Program of 1989, and the regulations of the Environmental Protection Agency (EPA) and the Alabama Department of Environmental Management (ADEM). The UTILITY will procure and pay for all licenses and permits that are necessary for its performance of the work.

REVISED
6-16-99

SAHD No. 4
Page 4 of 5

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed by their respective officers, officials and persons thereunto duly authorized, and the agreement is deemed to be dated and to be effective on the date hereinafter stated as the date of its approval by the Governor of Alabama.

WITNESS: _____

APPROVED AS TO FORM:

BY: _____

Jim Ippolito, Jr.
Chief Counsel,
Alabama Department of Transportation

To the best of my knowledge this document complies with the laws, rules, and regulations of the State of Alabama.

RECOMMENDED FOR APPROVAL:

BY: _____

_____
(Typed Name)
Division Engineer

BY: _____
Robert G. Lee
Utilities Engineer

STATE OF ALABAMA DEPARTMENT OF TRANSPORTATION ACTING BY AND THROUGH ITS TRANSPORTATION DIRECTOR

_____
G. M. Roberts
Transportation Director

_____
(Legal Name of Utility)

BY: _____
(Signature and Title)

_____
(Typed Name)

_____
(Typed Title)

_____
(Address)

_____
(Telephone)

The within and foregoing Agreement is hereby approved on this_____ day of _____, 19___.

_____
Don Siegelman
GOVERNOR
STATE OF ALABAMA

REVISED
6.16.00

SAHD No. 4
Page 5 of 5

DETAILED ESTIMATE

1. The Utility desires to be notified twenty-four (24) hours in advance of the State's Contractor beginning work.

_____ Yes _____ No

2. The Utility will have an Inspector on the project, during operations affecting the Utility.

_____ Yes _____ No

3.

ITEM NO.	UNIT	EST. COST PER UNIT	QUANTITY	DESCRIPTION	TOTAL EST. COST/ITEM

Total Estimated Cost _____
(Enter here and on the Agreement form)

REVISED
10-01-95

SAHD No. 5
Page 1 of 1

Letter of Retention
of Utility Facilities
No Conflict with Project

Date _____

Mr. _____
Division Engineer
Alabama Department of Transportation

_____

_____

ATTN: Mr. _____
Utility Engineer

RE: _____ County

Project No.: _____

Description: _____

Dear Sir:

Regarding the above referenced Highway Construction Project, we have examined the plans, which you furnished to this office on _____ and find no apparent conflict with facilities owned by this company. These facilities were constructed under prior permit and/or agreement.

Sincerely,

REVISED
6-16-99

SAHD No. 6
Page 1 of 3
Supplementing SAHD No. 2

SUPPLEMENTAL AGREEMENT FOR UTILITY RELOCATION COST

THIS SUPPLEMENTAL AGREEMENT is entered into by and between the State of Alabama Department of Transportation acting by and through its Transportation Director, hereinafter referred to as the STATE, and _____, hereinafter referred to as the UTILITY.

WITNESSETH:

WHEREAS, the parties did enter into an Agreement effective the _____ day of _____, 19____ for the relocation of a specific portion of the UTILITY'S facilities in conflict with the construction of the STATE'S Project No._____ in _____ County, Alabama; and

WHEREAS, certain conditions encountered necessary to the construction of the project have caused an increase in the original estimated cost of relocation, the parties desire to enter into this Supplemental Agreement to cover an increase in estimated cost in the amount of $ _____ as described in detail in Supplemental Estimate No. _____ transmitted herewith and made a part hereof by reference;

NOW, THEREFORE, the parties do hereby agree that the original Agreement be and the same is hereby amended by this Supplemental Agreement consisting of the above mentioned items and prices, and they do agree that the estimated cost contained in the original Agreement be increased in the amount of the increased estimated cost above set forth, and that this Supplemental Agreement be and is hereby made a part of the original Agreement to be performed under the terms and conditions thereof, and that said original Agreement is in full force and effect except insofar as it might be modified by this Supplemental Agreement.

The paragraphs set forth below are applicable to this Agreement only if Federal appropriated funds are available or will be available in the project by which the relocation required by this Agreement is necessitated.

In the event any Federal Funds are utilized for this work the following certification is made:

The undersigned certifies, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

1. Exhibit N is attached hereto and made a part hereof.

REVISED
6-16-99

SAHD No. 6
Page 3 of 3
Supplementing SAHD No. 2

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed by their respective officers, officials and persons thereunto duly authorized, and the agreement is deemed to be dated and to be effective on the date hereinafter stated as the date of its approval by the Governor of Alabama.

WITNESS:

_____
(Legal Name of Utility)

_____ BY: _____
(Signature and Title)

APPROVED AS TO FORM:

_____
(Typed Name)

BY: _____
Jim Oppolito, Jr.
Chief Counsel,
Alabama Department of Transportation

_____
(Typed Title)

To the best of my knowledge this document complies with the laws, rules, and regulations of the State of Alabama

_____
(Address)

RECOMMENDED FOR APPROVAL:

_____
(Telephone)

BY: _____
(Typed Name)
Division Engineer

BY: _____
Robert G. Lee
Utilities Engineer

STATE OF ALABAMA DEPARTMENT OF
TRANSPORTATION ACTING BY AND THROUGH ITS
TRANSPORTATION DIRECTOR

_____
G. M. Roberts
Transportation Director

The within and foregoing Agreement is hereby approved on this_____ day of _____ , 19___.

_____
Don Siegelman
GOVERNOR
STATE OF ALABAMA

EXHIBIT N

FUNDS SHALL NOT BE CONSTITUTED AS A DEBT

It is agreed that the terms and commitments contained herein shall not be constituted as a debt of the State of Alabama in violation of Article 11, Section 213 of the Constitution of Alabama, 1901, as amended by Amendment Number 26. It is further agreed that if any provision of this agreement shall contravene any statue or Constitutional provision of amendment, either now in effect or which may, during the course of this agreement, be enacted, then the conflicting provision in the agreement shall be deemed null and void.

TERMINATION DUE TO INSUFFICIENT FUNDS

a. If the agreement term is to exceed more than one fiscal year, then said agreement is subject to termination in the event that funds should not be appropriated for the continued payment of the agreement in subsequent fiscal years.

b. In the event of proration of the fund from which payment under this agreement is to be made, agreement will be subject to termination.

REVISED
2 22 08

SAHD No. 12
Page 1 of 2

AGREEMENT TO TERMINATE A REIMBURSABLE UTILITY RELOCATION AGREEMENT

PROJECT NUMBER

Utilities_____

Construction_____

This Agreement is entered into by and between the State of Alabama Department of Transportation acting by and through its Transportation Director hereinafter referred to as the STATE

and,_____

_____ hereinafter referred to as the Utility.

WITNESSETH

WHEREAS, an initial investigation revealed that a portion of the UTILITY'S facilities located along the STATE'S Project No. _____ was in conflict with the proposed construction of the project; and

WHEREAS, the STATE and UTILITY have heretofore executed an Agreement with the effective date of _____, 19_____, whereby the STATE agreed to expend Federal and/or State highway funds in the estimated amount of $ _____ for the cost of relocation of the UTILITY'S facilities found to be in conflict with construction of said project; and

WHEREAS, subsequent to execution of the above Agreement a determination has been made that changes in the STATE'S project plans will necessitate a change in the UTILITY relocation plans, thereby requiring changes in the actual cost of the UTILITY work.

NOW THEREFORE, the parties agree that the agreement executed by and between the parties on the effective day above set forth is hereby terminated and declared to be null and void and of no further effect. The parties further agree to proceed to the development of a substitute agreement, if needed, applicable to the facts and circumstances of the project and utility relocation need.

REVISED
6 16 00

SAHD No. 12
Page 2 of 2

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed by their respective officers, officials and persons thereunto duly authorized, and the agreement is deemed to be dated and to be effective on the date hereinafter stated as the date of its approval by the Governor of Alabama.

WITNESS: _____

_____
(Legal Name of Utility)

BY: _____

Jim Ippolito, Jr.
Chief Counsel,
Alabama Department of Transportation

BY: _____
(Signature and Title)

To the best of my knowledge this document complies with the laws, rules, and regulations of the State of Alabama.

_____
(Typed Name)

RECOMMENDED FOR APPROVAL:

_____
(Typed Title)

BY: _____

_____
(Address)

_____
(Typed Name)
Division Engineer

_____
(Telephone)

BY: _____
Robert G. Lee
Utilities Engineer

STATE OF ALABAMA DEPARTMENT OF TRANSPORTATION ACTING BY AND THROUGH ITS TRANSPORTATION DIRECTOR

_____
G. M. Roberts
Transportation Director

The within and foregoing Agreement is hereby approved this _____ day of _____, 19___.

_____
Don Siegelman
GOVERNOR
STATE OF ALABAMA

EXHIBIT N

FUNDS SHALL NOT BE CONSTITUTED AS A DEBT

It is agreed that the terms and commitments contained herein shall not be constituted as a debt of the State of Alabama in violation of Article 11, Section 213 of the Constitution of Alabama, 1901, as amended by Amendment Number 26. It is further agreed that if any provision of this agreement shall contravene any statue or Constitutional provision of amendment, either now in effect or which may, during the course of this agreement, be enacted, then the conflicting provision in the agreement shall be deemed null and void.

TERMINATION DUE TO INSUFFICIENT FUNDS

a. If the agreement term is to exceed more than one fiscal year, then said agreement is subject to termination in the event that funds should not be appropriated for the continued payment of the agreement in subsequent fiscal years.

b. In the event of proration of the fund from which payment under this agreement is to be made, agreement will be subject to termination.

Form SJ 114
Rev 1/96

ALABAMA DEPARTMENT OF TRANSPORTATION

ACCIDENT REPORT

All accidents must be reported as soon as possible. Forward two (2) copies to Legal Bureau, Alabama Department of Transportation, Montgomery, and one (1) copy to the Division Engineer. One (1) copy is to be retained by the person making report. FILL IN ALL BLANKS AS COMPLETE AS POSSIBLE, and forward within ten (10) days from date of accident. Use extra sheets if necessary.

Date of Accident _____, 19 ____ ; Hour ____ AM ____ PM

Place where accident happened: County _____ City, Town or Community _____

Accident Happened On _____
Give name of street, highway number (US or State), identify by Name

Vehicle No. 1 (DOT Vehicle) _____

_____ License No. _____ Equip No. _____
Year Model Make Type (Sedan, Truck, Bus, etc.)

Driver: _____ _____ _____ ____ ____ ____
Name St. or RFD City & State Age Sex Race

Division _____ District _____

Owner if Leased _____ _____ _____
Name St. or RFD City & State

Parts of Vehicle damaged _____ Approx. Cost to Repair $ _____

Vehicle removed to _____ Driveable: Yes ____ No ____

Was other State equipment damaged? If yes, describe _____

Approx. cost to repair equipment $ _____

Vehicle No. 2 _____

_____ License Plate _____
Year Model Make Type (Sedan, Truck, Bus, etc.) Year State Number

Driver: _____ _____ _____ ____ ____ ____
Name St. or RFD City & State Age Sex Race

Owner _____ _____ _____
Name St. or RFD City & State

Parts of Vehicle damaged _____ Approx. Cost to Repair $ _____

Vehicle removed to _____ Driveable: Yes ____ No ____

Is vehicle insured: Yes ____ No ____ _____
Name of Insurance Company

If not, did driver have insurance applicable: Yes ____ No ____ _____
Address of Company

Type and Amount Insurance: Collision: Yes ____ No ____ Amount Deductible: $ _____ : Bodily Injury & Property

Damage $ _____ : Medical Payment $ _____

Damage to property other than vehicles: _____
Name object, ownership and nature of damages

_____ Approx. Cost to Repair $ _____

Injured: Name _____ Address _____ ____ ____ ____
Age Sex Race

Injured taken to _____ Did injured die ____ Nature & extent of injuries _____

Injured: Name _____ Address _____ ____ ____ ____
Age Sex Race

Injured taken to _____ Did injured die ____ Nature & extent of injuries _____

Witnesses: Name _____ Address _____

Name _____ Address _____

Name _____ Address _____

Name _____ Address _____

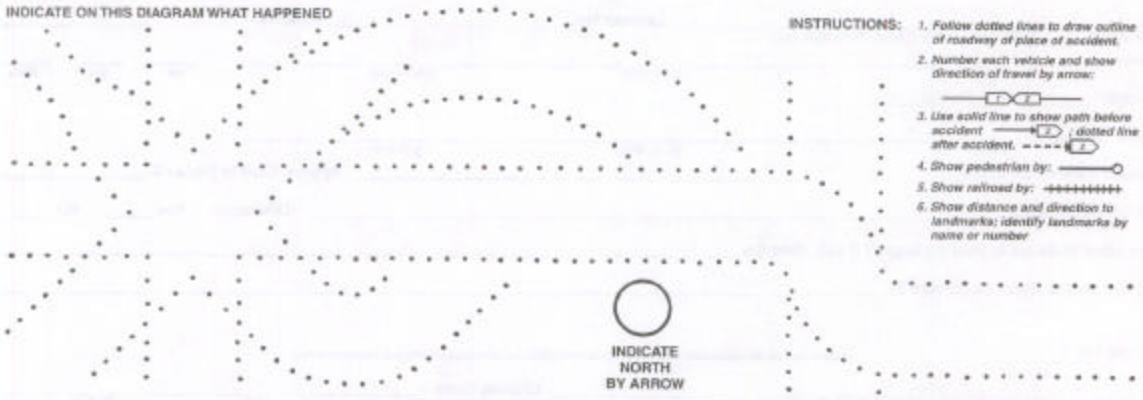
Name _____ Address _____

Form SJ-114 "ALDOT Accident Report" (Page 2 of 2)

How Accident Occurred: _____

Sketch Showing How Accident Occurred:

INDICATE ON THIS DIAGRAM WHAT HAPPENED



INSTRUCTIONS:
1. Follow dotted lines to draw outline of roadway of place of accident.
2. Number each vehicle and show direction of travel by arrow:
3. Use solid line to show path before accident ; dotted line after accident.
4. Show pedestrian by:
5. Show railroad by:
6. Show distance and direction to landmarks; identify landmarks by name or number

Traffic Control:
- ____ Men Working
- ____ Officer or Watchman
- _____ Other (Specify)

Weather:
- ____ Clear
- ____ Raining
- ____ Snowing
- ____ Fog
- _____ Other (Specify)

Vehicle Condition

No. 1	No. 2	
____	____	Defective Brakes
____	____	Improper Lights
____	____	Defective Steering Mechanism
____	____	Defective Tires
		_____ Other (Specify)
____	____	No defects

Drivers' Violations:

Vehicle 1	Vehicle 2	
____	____	Driving under influence of intoxicants
____	____	Exceeding lawful speed
____	____	Too fast for conditions
____	____	Failed to yield right-of-way vehicle
____	____	Failed to yield right-of-way pedestrian
____	____	Following to closely
____	____	Improper passing
____	____	On wrong side of road-not overtaking
____	____	Improper turn
____	____	Failed to give proper signal
____	____	Disregarded stop and go signal
____	____	Disregarded stop sign
____	____	Disregarded other traffic control
____	____	Improper starting from parked position
____	____	Improper parking location
____	____	Other improper actions: (Specify) _____
____	____	No violations

Remarks and Recommendations _____

Submitted by: Name _____ Address _____

Remarks and Recommendations of Division Engineer or Bureau Chief _____

Signed: _____
Division Engineer or Bureau Chief

SJ 120-A-OE
Rev. 9/2000

SUMMARY OF TIME CHARGES PROJECT ACCEPTED _____

Time Charges Began _____
Work Began _____

Project No. _____
County _____

(1) Calendar Month	(2) Days Charged	(3) Days chg. To Date	(4) Sun. N/C	(5) Sat. N/C	(6) Holi. N/C	(7) Bad Wth.	(8) Other N/C	(9) Cal. Days To date	(10) Remarks

TIME STATEMENT FOR FEDERAL AID AND STATE PROJECTS

SJ 120 (Revised 5/1/80) Date _____

Project Number _____
County _____
Type _____
Length _____
Contractor _____

Bids Received _____ Contract Approved _____ Work Order Issued _____
Work Started _____

---

(1) Time Started _____ Project Accepted _____
Total elapsed calendar days from date Time Started to the date on which the project was accepted by State. _____

(2) Work Suspended _____ Work Resumed _____
Total calendar days project was inactive _____

(3) Saturdays not charged _____
Sundays not charged _____
Holidays not charged _____

(4) Days on which bad weather prevented work _____
Days not charged for other reasons _____

(5) Days not charged against contract time _____

(6) (Working, Calendar) Days actually used _____

(7) (Working, Calendar) Days allowed in contract _____

*(8) Extension in time allowed because of overrun in contract amount

_____ x = _____

(9) Approved requests for extensions in contract time (Include Supplemental Agreements)

Approved by Construction Engineer on _____ for _____
Approved by Construction Engineer on _____ for _____
Approved by Construction Engineer on _____ for _____
Total days extension approved _____

(10) Total days allowed to complete contract _____

(11) Overrun of contract time limit _____

(12) Liquidated damages _____ days at $ _____ per day $ _____

(Signed) _____

(Title) _____

$$\frac{\text{*Total Overrun of Original contract Amount} - \text{Approved Supplemental Agreements for which additional time was previously granted}}{\text{Original Contract Amount}} \times \text{Original Contract Time} = \_\_\_\_$$

INSTRUCTIONS FOR PREPARING
TIME STATEMENT FOR FEDERAL AID AND STATE PROJECTS

Headings: Should be completely filled out and submitted with final estimate for all projects constructed entirely or in part with Federal funds, and all State projects constructed under contracts.

(1) The total number of calendar days should not include the day project was placed on maintenance unless the contractor actually worked that day.

(2) List here the date on which work was suspended, the date on which work was resumed and the total calendar days BETWEEN these two dates.

(3) List here all Saturdays, Sundays and Holidays which occur between the date on which Time Started and the date on which the project was placed on maintenance, both dates inclusive. Saturdays, Sundays and Holidays occuring during the period of inactivity, under (2) above, should not be included in this list.

(4) List here all days on which weather or other causes prevented the contractor from working. These dates should agree with the Project Engineer's weekly construction project reports.

(5) Sum of (2), (3) and (4).

(6) Difference between (1) and (5).

(7) Should be taken from the original contract.

(8) To be used only in case the final **estimate** amount is in excess of the contract amount. Show calculations by which extension was computed.

(9) List here the date on which each request for extension in the contract time was approved, the number of days extension approved in each request and the total number of days extension approved.

(10) Sum of (7) (8) and (9).

(11) Difference between (6) and (10).

(12) If (11) is a negative quantity no Liquidated Damages are applicable. If (11) is a postive quantity the number of days shown in (11) should be multiplied by the proper sum for Liquidated Damages per day as set out in the Standard Specification.

Note: In the event that the contract requires that the project be completed on a specific date, instead of in a required number of working days, this form must be adjusted so that it may be used to indicate whether the contractor completed the project on or before the required date or whether he overran the required date of completion, the number of days overrun and the amount of Liquidated Damages for which he is liable.

REVISED
10-01-95

Form SP-1

ALABAMA DEPARTMENT OF TRANSPORTATION
DAILY UTILITY RELOCATION REPORT

COUNTY_____ DIVISION_____ DISTRICT_____ REPORT NO.____
PROJECT NO.:_____ DAY:_____ DATE:_____
TEMPERATURE HI:_____ LOW:_____ AVG:_____ LOCATION STA:_____ STA:_____

Utility Personnel on Project

Name	Title	Hrs.	Name	Title	Hrs.

Material Used This Date (Quantity, Size, and Kind)

Recovered Material (Reused, Salvaged, Scrap)

Utility Equipment Used This Date:

Kind	Size	Hrs.	Kind	Size	Hrs.

Remarks (Work Performed, Delays, Etc.)

Company Representative

ALDOT Inspector

REVISED
10.01.06

Form SP-3

ALABAMA DEPARTMENT OF TRANSPORTATION
UTILITY RELOCATION PROGRESS REPORT

TO: _____
Division Engineer

Period Ending _____

FROM: _____
Project Engineer

RE: _____ County

PROJECT NO. _____

DESCRIPTION _____

_____

_____

_____

LETTING DATE: _____

	UTILITY OWNERS					
If more than six owners, use an additional form						
Date work authorized by Division						
Proposed begin work date						
Actual date work began						
Percent complete this date						
Are project records adequate?						
Is progress of work satisfactory?						
Proposed date of completion						
Actual date of completion						

Submitted: _____
Project Engineer

REMARKS:

Reviewed: _____
Division Engineer

cc: Design Bureau
Division Engineer
District Engineer
Project Engineer

ALABAMA DEPARTMENT OF TRANSPORTATION

Utilities Section

Statement of Charges

(Prepare 7 Copies and attach 1 to each of the 7 copies of your invoice)

Company Name _____	Contact Person (Audit) _____
Address Where Records May be Audited _____	Telephone # _____
	FAX # _____
AGREEMENT AMOUNT _____	Project Number _____
CHANGE ORDERS #1 _____	County(ies) _____
#2 _____	
#3 _____	Partial Final
#4 _____	DOT Invoice No. _____
TOTAL _____	
Company Inv./Work Order No. _____	Amount of this Bill _____
Date Prelim. Eng. Began _____	Total Amount of Previous Bills Submitted _____
Date Construction Began _____	
Date Construction Completed _____	Total to Date _____

CERTIFICATION

We certify that the above bill is true and correct and that payment thereof has not been received.

Signature	Notary Public	
Title	My Commission Expires	
Date	Date	Notary Seal

FOR THE DEPARTMENT:

Checked & Quantities Verified	Project Engineer	Date
Checked	Division Utilities Engineer	Date
Recommended for Payment	Division Engineer	Date
Recommended for Payment	State Utilities Engineer	Date
Recommended for Payment	External Auditor	Date
Approved for Payment	Chief External Auditor	Date

*****Attach separate sheets for additional comments.*****

Contractor Payroll Errors and Labor Violations
(Overtime Wages Involved)

TO: DATE: _____

(Prime Contractor and Address)

RE: Project _____
_____ County
Wage Violation

Gentlemen:

The payroll transcript submitted by _____
(Name of Contractor or Subcontractor)
for payroll period ending _____ has been found to contain the following
(Date)
described errors that have resulted in an underpayment to the following employee(s):

Employee's Name:	Description of Errors:
_____	_____
_____	_____
_____	_____

Due to the error(s) resulting in an underpayment, this must be judged as a labor violation and since the violation involves overtime wages, in accordance with the Work Hours and Safety Act of 1962, we are required to calculate liquidated damages at the rate of $10.00 per day per man. Our calculation for liquidated damages for violation(s) on this payroll transcript is _____
(Number)
men X _____ days X $10.00 = $_____.
(Number) (Liquidated Damages)

Because of this finding, you are required to do the following:

1. Prepare and submit a supplemental payroll paying the employee(s) the additional amount due him along with a Form Ala. 100 certifying that the supplemental payroll is correct and that the employee(s) has been paid.

2. Prepare a letter of explanation, giving your reasons in detail why the underpayment occurred. Do not use such phrases as "due to error" or "due to oversight" but explain in this manner, "The total hours worked were incorrectly added on the Foreman's time sheet and the payroll clerk failed to catch the error."

3. List corrective measures you have taken to prevent a reoccurrence. For example, "All transferred data from time sheets and payroll calculations are now being double checked by a second person."

4. List any reasons that you have why FHWA and/or the U. S. Deartment of Labor should not assess you for the liquidated damages that have been calculated.

Yours truly,

cc: Division Engineer
State Office Engineer
File

Contractor Payroll Errors and Labor Violations
(Overtime Wages Not Involved)

TO: DATE: _____

(Prime Contractor and Address)

RE: Project _____
_____ County
Wage Violation

Gentlemen:

The payroll transcript submitted by _____
(Name of Contractor or Subcontractor)
for payroll period ending _____ has been found to contain the
(Date)
following described errors that have resulted in an underpayment to the following employee(s):

Employee's Name:	Description of Errors:
_____	_____
_____	_____
_____	_____

Due to the error(s) resulting in an underpayment, this must be judged as a Labor Violation and you are required to do the following:

1. Prepare and submit a Supplemental Payroll paying the employee(s) the additional amount due him along with a Form Ala. 100 certifying that the Supplemental Payroll is correct and that the employee(s) has been paid.

2. Prepare a letter of explanation, giving your reasons in Detail why the underpayment occurred. Do not use such phrases as "Due to Error" or "Due to Oversight" but explain in this manner, "The total hours worked were incorrectly added on the Foreman's time sheet and the payroll clerk failed to catch the error."

3. List corrective measures you have taken to prevent a reoccurrence. For example, "All transferred data from time sheets and payroll calculations are now being double checked by a second person."

Yours truly,

cc: Division Engineer
State Office Engineer
District Engineer
File

Detailed Review of Contractor Documentation for Preparation
of Weekly Payroll Transcripts

Date of Review: Project No.

Paryoll Period: Contractor:

Do the basic records contain a time sheet for the contractor's employees?

Does the time sheet contain:

(a) The correct classification or classifications of each employee?
(b) If employee is an apprentice or trainee, is he duly registered in a bona fide apprenticeship or training program?
(c) The correct rate or rates of pay as established in the contract for the specific classification or classifications of each employee?
(d) Where fringe benefits are applicable, have payments been made in an approved manner?
(e) The daily and weekly number of hours worked by each employee?
(f) The proper week ending date and the timekeeper's signature?

Does all information shown on basic time sheets agree with that shown on the certified copy of the contractor's payroll transcript for the payroll period involved?

Have all checks issued to the employees cleared the bank?

Deductions:

(a) Have deductions been shown on employees' check stubs?
(b) If so, do the deductions and actual amount of the checks agree with the deductions and net wages shown for the employees on the payroll transcripts?
(c) In case of deductions for employee advances, was interest charged on the money loaned?
(d) In case of deductions for uniform rental, does the contractor have in his files written authorization from each affected employee to make the deduction from his wages?

Have interviews been made with employees with regard to payroll data and classification information?

Complaints:

(a) Have complaints been made by employees?
(b) If so, were the complaints justified?
(c) Have they been resolved?

Have subcontractors been checked to see if:

(a) The labor provisions were physically incorporated?
(b) If so, are wage rates (when applicable) included?

Remarks:

Signed: _____

Title: _____

TO: (Property Owner)

Re:

Dear Sir:

Please be advised that the above referenced project has been let to contract and work on this project will begin in the near future.

In acquiring the Right of Way for this project, your property shown as Tract Number _____ _____ was acquired through Condemnation Proceedings.

This makes it your responsibility to reset to the acquired Right of Way Line, any fence now on our Right of Way and which necessitates resetting.

If the Right of Way Limits are not staked, please contact the Office of our Project Engineer or this office, so that we may do the necessary staking in order for you to reset your fence.

Yours very truly,

cc: District Engineer
Project Engineer
File

STRUCTURE RELEASE

STATE OF ALABAMA
_____ COUNTY

I (We) do hereby release _____ Contractor, and the Alabama Department of Transportation on Project No. _____, _____County Alabama, and relinquish any right or claim (we) now have or might have in the future for any claim whatsoever for any damages, consequential or otherwise, due to, or arising from the moving and/or relocating of my property known as Structure No. _____ and shown on the plans of the State Highway Department for the grading and improvement of said project.

IN WITNESS, I (we) have hereunto set our hand and seal this the _____ day of _____, 20 _____.

WITNESS

_____ _____
OWNER

_____ _____
OWNER

OJT MONTHLY TRAINING SUMMARY

Division: Date:

Project Number	Number Of Training Hours in Contract	Number of Training Hours complete	Percent of Project Complete	Percent of Training Complete	Number Of Minority Males	Number Of Minority Females	Number Of Non-Minority Males	Number of Non-Minority Females

Prepared By:
Signature:
Job Title:
Date:

ALABAMA DEPARTMENT of TRANSPORTATION
TRAINEE ENROLLMENT / TIME REPORT
Division:
Report Date:

Trainee Name/ Address/ Phone Number	Sex/Age/ Race	Social Security #	Classification	New hire/ Re-hire/ Upgrade	Training Hours Required	Hours Trained To Date	Date Training Started	Date Training Ended/ Reason	Project Number/ County	Contractor

Prepared By:
Signature:
Job Title:
Date:

REVISED 2/91

DATE: _____

INDIVIDUAL EMPLOYEE INTERVIEW

Project No.: _____ County: _____
Contractor: _____
Employee's Name: _____
Job Classification: _____ Rate of Pay: _____
Work Being Performed: _____
Is employee satisfied with number of hours that he is being paid for? _____
In his opinion, is he being paid at least the minimum wage for classification in which he is working? _____ If dissatisfied, why? _____
_____

Has Contractor's EEO Policy been explained to you? _____
When? _____ By whom? _____
Has Contractor's Training Program been explained to you? _____
When? _____ By whom? _____
Do you feel that you should be trained for another job? _____ Why? _____
_____

Which job? _____
Have you been asked to refer or bring any minorities or females for work? _____
Any complaints concerning working conditions? _____
If so, what? _____
Do you feel that you have been discriminated against? _____ Why? _____
_____

How long have you worked for this contractor? _____
What was your starting job classification? _____
What is your national origin? _____ Race? _____

TO BE ANSWERED BY INTERVIEWER

Actual job classification for this employee as shown on payroll:
(Week Ending _____)
Classification: _____ Rate of Pay: _____
Do you think the employee understands the questions you asked him? _____
Do you think he has given you honest and sincere answers to the best of his ability? _____

Other comments: _____
_____
_____
_____

Signed: _____

Title: _____

CERTIFICATION OF ACTUAL PAYMENTS TO
DBE FIRMS

1. The undersigned prime contractor on Alabama Project No. _____ _____ Hereby certifies that full payment was made, or will be made within five days after final payment, to firms for material and/or work performed under this project's contract as follows:

DBE Firm Name _____ was or
Will be paid $ _____.

This certification is made under Federal and State laws concerning false statements. Supporting documentation for this payment is subject to audit and should be retained for a minimum of three (3) years from project acceptance date.

_____
Prime Contractor

BY: _____

TITLE: _____

DATE: _____

2. This undersigned subcontractor/supplier for the above named project hereby certifies that payments were received, or are due to be received as stipulated above.

_____
Subcontractor/Supplier

BY: _____

TITLE: _____

DATE: _____

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9/2000

ENGINEER'S MONTHLY INVENTORY OF EQUIPMENT
(Engineering Equipment Only)

Project No. _____

_____

For Month Ending: _____

QUANTITY	ITEM	SHD NO., SERIAL NO., OR DIVISION NO.

I hereby certify that the equipment listed above is in my custody

_____
(Custodian of Equipment)

_____
Title

Sheet _____ of _____

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PROJECT TRAFFIC CONTROL
INSPECTOR'S ACCIDENT REPORT

DATE	PROJECT NUMBER	DIVISION	DISTRICT	COUNTY

Type of Project	Contractor

Location of Project

Type Traffic Control Plan For Project: (Use AMUTCD Sec. G)

Phase of TCP in Use at Time of Accident: (Flagmen Ahead, Lane Closed, etc.)

Location of Accident: (Use Mile Post Reference if Possible)

Type Work Being Performed in Accident Area:

Condition of Roadway	Weather Conditions

ACCIDENT DATA

Time	Vehicles, Equipment, Etc. Involved

Injuries

Description of Accident
(List names witness, investigating Officer, and any pertinent data also:)

Signature of Inspector

2:1 GRADING AND DRAINAGE

2:1:A Clearing and Grubbing

The clearing and grubbing operation, although shown as one pay item, actually involves two separate operations. By clearing it is meant the removal of trees, brush, and shrubs from within the limits of a designated area. Grubbing usually refers to the removal of all projecting roots, stumps and similar obstacles with-in the construction limits. Removal should be to a depth of at least one foot below the existing ground surface in fills.

The importance of properly clearing and grubbing a project cannot be over emphasized. Many failures that we encounter in our roads can be traced to an area that has been improperly cleared and grubbed. It must be pointed out that the success in building a road begins with the clearing and grubbing operations. It is essential therefore that inspection personnel assigned to this work be informed and so instructed as to the seriousness of the work. They should remain alert for conditions, which will result in any future maintenance problems. Stumps or logs left in the subgrade can cause failures in the roadway.

The Project Engineer, inspector and the contractor's designated superintendent should field check the project together. They should discuss and agree on the method of stake out control. The contractor's superintendent will be made aware of any special conditions in the right of way agreements, special provisions and plans. The superintendent should be advised of the method of marking trees and shrubs that are to remain outside the construction limits.

Prior to beginning clearing and grubbing operations, the limits of the clearing must be established by the Project Engineer. Normally, these limits involve the total area inside the right-of-way lines. In certain geographical situations these limits may be established 10 to 15 feet beyond the cut or fill tie point. This will provide a buffer area to prevent the disturbance of root systems in cut sections and to prevent a silt buildup around trees immediately at the toe of fill slopes.

Also prior to beginning this work, the contractor must submit a satisfactory plan for the disposal of debris within (30) days after accumulation. If the method of disposal is to be by open burning, the contractor must also submit a fire prevention plan in accordance with Article 107.13. Written permission to open burn should not be given by the Project Engineer until such plans are received. In the majority of the counties within the State, the Alabama Department of Environmental Management has provided a **"Proclamation Approving Open Fires Under Certain Conditions"**. A specific permit from this agency allowing the contractor to open burn will not be required unless the contractor desires to deviate from or violate some of the guidelines contained therein. No open burning of untreated wood, tree trimmings, brush or plant growth generated by clearing or maintenance of land, or from demolition or other practices conducted for the construction of any transportation, utility, or communication line may be conducted in Baldwin, Jefferson, Madison or Mobile Counties during the months of May, June, July, August and September. **Jefferson County and the City of Huntsville (Inside City Limits) have local programs of air pollution control and special permits must be obtained by the contractor from these political sub-divisions when operating in these areas.**

The contractor shall abide by appropriate fire codes of local governments having jurisdiction over the area, secure any required permit, release or comply with instructions or directives from the Alabama Forestry Commission, fire marshal or local governmental air pollution control program

Additional information covering open burning may be found in ADEM Administrative Code Chapter - 335-3-3 "Control of Open Burning and Incineration" and ADEM "Proclamation No. 3" dated April 2,1999.

NOTE! Information and guidance for obtaining a Burn Permit may be found on pages 6 & 7 of this segment of the Construction Manual.

In lieu of open burning the contractor's plan for disposal of clearing and grubbing rubbish may include the disposing of materials outside the right-of-way Limits. The contractor may dispose of this rubbish in a landfill approved for fill materials of this type or on private property. In the case of the latter, the contractor must obtain written permission from the property owner. However, written permission of the property owner does not necessarily automatically provide approval by the Department. Prior to approval of such disposal areas by the Department, the Project Engineer should assure that the contractor's plan of disposal includes the following:

1. Disposal area is not in a location to present an unsightly appearance to the project.

2. Satisfactory method of treatment of the area for appearance and erosion control is specified in the plan.

3. Disposal area will not present future maintenance problems for the Department.

4. Provide approved storm water permit.

5. If wetlands are impacted, provide Corp of Engineers clearance or permit.

6. Provide historical and archaeological clearances from State Historical Preservation Officer.

7. Provide professional biologist report indicating no threatened or endangered species are impacted.

The acreage of Clearing and Grubbing indicated in the lump sum pay item shall be defined as an area from right of way to right of way including easement areas as designated on the plans for the entire length of the project. The Contractor will usually be required to perform selective clearing outside of the construction limits. This work shall consist of removing dead, diseased and undesirable trees and shrubs. The Project Engineer and the inspector should give thoughtful consideration to trees, shrubs, etc, which are to be left outside of the construction limits. As an example, a larger tree, which at the time is a good shade tree or a desirable looking tree may be at the age when decay is setting in. It is often better to consider cutting the larger tree and leaving the smaller one which will have a longer life expectancy. Another point to be taken into consideration in determining whether or not a tree is to be left in place is the nearness of the construction limits. If during the construction of a cut, a part of the root system of a tree is destroyed, often times this will result in the tree dying. If a tree is left too close to the toe of a fill slope, silt and mud may be deposited around the tree above its natural ground line, causing death to the tree.

Stumps outside the construction limits may be permitted to remain provided they are cut off as near as possible to the ground line and treated with a Department approved herbicide. The treatment of these stumps will prevent re-growth and minimize contamination of the dead wood by borers and other insects. Following this procedure will lessen the possible spreading of such infestation to adjoining property. Natural ground cover should be protected as far as practical. In doing so, siltation to adjoining property will be prevented. Stump holes or depressions left by the removal of stumps shall be backfilled in accordance with Article 210.03 of the Standard Specifications.

Grubbing outside actual foundation excavation limits at bridge sites and channel changes should not be performed in most cases. Stumps, which aid in erosion control, should be left in place provided they will not act as debris (drift) catchers. Bridge contracts let in advance of roadway contracts, or if there is no roadway contract involved, shall include clearing and grubbing of the bridge site. The bridge site is defined as an area bounded by the right of way width and straight lines extending through points one foot outside of the extreme limits of the structure wings, end bents or abutments to the right of way line.

The type equipment used during the clearing and grubbing operations shall be determined by the Contractor. The contractor's selection of equipment, shall in all cases be of such a type that satisfactory results may be achieved. The type of equipment normally used by the Contractor will be dozers equipped with clearing forks or grubbing forks. Special attention is called to Article 107.13 of the Alabama Department of Transportation Standard Specifications for Highways and Bridges. Any trees previously designated to remain and are damaged by the Contractor should be repaired or replaced at no additional cost. All cut or scarred surfaces of trees and shrubs should be treated with an asphaltum base paint especially prepared for tree surgery and approved for use by the department. (see Subarticle 860.10(d). The inspector should review plan notes to determine the appropriate disposition of all merchantable timber.

The inspector's attention is also called to Section 665 of the Standard Specifications, which covers temporary erosion control. This Section states that a Contractor shall not expose more than 17 1/2 acres of erodible material for any separate major operation without prior approval of the Engineer. Consideration for an increase in the specific limit may be given upon written request and presentation of an acceptable justification for such an increase.

Various areas should be cleared and grubbed to the extent that topsoil stripped from them will not contain stumps or roots that cannot be used at a later date. Cut and fill areas often will be stripped and the stripping stockpiled for use as topsoil. The Contractor should not be permitted to strip these areas until his/her clearing and grubbing operation is complete. The inspector should notify the Project Engineer when an increment of the right of way is satisfactorily cleared and grubbed. The Contractor should not be permitted to begin grading until approval by the Project Engineer of the cleared and grubbed increment is given.

Engineering

Before the Contractor arrives on the project, roadway sections will have been plotted, by office personnel, either manually or by computer, at each station where original cross sections were taken. These roadway sections will indicate the approximate "tie point" to natural ground of each cut and fill slope. The first duty of the Engineer under the item of Clearing and Grubbing will be to pick these indicated "tie" distances from the roadway cross sections and establish these distances in the field, usually at 100 feet increments. Generally, and as a minimum depending on the terrain, 10 to 15 feet is added to the indicated cross section "tie" distance and the clearing limit designated by flagging tape being attached to the nearest shrub or tree. If select clearing is required beyond these established limits, the Engineer should appropriately mark all trees and shrubs to be removed in this area. For certain type projects, such as Rest Areas, Welcome Centers, Scenic Overlooks, etc., the Engineer may wish to request assistance from the State Maintenance Engineer through the Construction Bureau for appropriate marking of trees to be selectively cleared.

The Engineer will also be responsible for staking the clearing limits for all changes in location, R.O.W. widths, or easement areas indicated on the plans. The increase in these areas, which are

required, but are not a part of the original plans, should be measured for the purpose of documenting the additional quantities. Increases in area will be paid for as extra work as defined by Article 104.03

The increase would be shown on the monthly estimate with an explanation in the Description Column such as "Increased payment for extra work made in accordance with Subarticle 201.05(a)."

Decreases in the original Lump Sum Bid may also be applied if changes as directed by the Engineer in location, R.0.W. widths or easement area result in a decreased acreage.

Inspection

The Clearing and Grubbing inspector should keep a daily inspector's report on **Form BC 101**. This report should include weather conditions, locations of clearing and grubbing by stations, contractor's labor and equipment and pertinent comments and instructions to the Contractor concerning the work. During the inspection of clearing and grubbing operations is an excellent time to make observations and a record by station number of areas which appear to be unusually soft, spongy, contain other evidence of unsatisfactory material, seeps or other conditions which may require corrective measures.

The following checklist for clearing and grubbing will be useful to the inspector:

1. Study specifications, standard plans and special provisions (Especially Section 201, Section 665 and other related sections.)

2. Is clearing and grubbing being performed within required limits?

3. Is timber being disposed of in accordance with plan and specification requirements?

4. Is he/she keeping an up-to-date record of the amount of exposed erodible area as grubbing is performed?

5. Has the inspector discussed necessary erosion control measures with the Project Engineer and contractor's personnel? (See that these erosion control items are promptly installed.)

6. Is the inspector alert for the necessity of additional erosion control measures? Have these been discussed with the Project Engineer?

7. Is selective clearing being done within normal clearing limits?

8. If burning is performed, is Item 201.03(e)1 of the specifications being followed? Has Contractor obtained permits and submitted fire prevention plans as required?

9. Is debris being disposed of outside of the right of way? Is this disposal area out of sight of the right of way? Does the Contractor have proper authority for this disposal area from the property owner and the Project Engineer? Has Contractor submitted and received approval of his/her plan for disposal on clearing debris and rubbish? Has all clearances and /or permits been obtained?

10. Has clearing and grubbing of additional right of way easements not shown on the plans been approved in writing? Has it been measured for payment?

11. Has inspector notified the Project Engineer when an increment of the right of way has been properly cleared and grubbed? Has an "on foot" inspection of the increment been made?

12. Has the Project Engineer been advised of possible soft or spongy materials, seeps or other unsatisfactory materials?

13. Does the inspector's diary show weather conditions, location where clearing and grubbing is being done each day, the size of the crew, the equipment being used and other special comments?

14. Is a department approved asphaltum base compound being used to treat scarred surfaces of a type especially prepared for tree surgery?

15. Are herbicides being used to treat stumps of a type approved by the Department? (Approval through State Maintenance Engineer.)

16. The areas cleared and grubbed each month should be shown on a plan sheet indicating the estimate number on which it was paid. (See Part 1, Section 3, Article B, Subarticle 110, page 1 of 50, Item 201-A).

BURNING PERMITS

ALABAMA FORESTRY COMISSION (AFC)
&
ALABAMA DEPARTMENT of TRANSPORTATION (ALDOT)

Burning permits are required for most outdoor burns such as New Ground, Fields, Grasslands, or Woodlands. Specifics are located in 9-13-11(6), 1975 Code of Alabama. However, the AFC (Alabama Forestry Commission) made an administrative decision to exempt burns of less than 1/4 acre that are more than 25 feet from a wooded area. (Many ALDOT related burns would be more than 1/4 acre and most would be closer than 25 feet to a wooded area) Even in those situations where permits are not required, it would be helpful to the AFC to know that ALDOT or its Contractor was burning. This can be done by calling the same toll free number used to obtain permits. This could also benefit ALDOT or its Contractor by receiving information about hazardous weather conditions.

Requests for permits are made by phone using a 1-800 - number. Permits are verbal and contain a different number for each request.

Each request requires the Section, Township and Range of the burn and the type or reason for the burn (in the case of ALDOT or its Contractor, it would normally be piled debris for road maintenance or construction).

The AFC Operator will ask for the name of a person who would be responsible for the burn.

The burner accepts responsibility to keep the fire contained and have adequate tools, equipment and manpower to accomplish this. In no case will the person requesting the permit allow the fire to be unattended until it is dead out.

A permit will be issued if the above criteria is met, unless the State Forester or Governor has issued a Fire Alert or Drought Emergency. Under a Fire Alert, the State Forester may restrict issuing burning permits. Under a Drought Emergency, the Governor declares there will be no permits issued and no outside burning of any type. During these conditions, the caller will be informed of the situation instead of receiving a permit.

There are days when conditions are more dangerous than other days. Permits will be issued, but the AFC Operator may warn the caller that high winds, low humidity, or other factors increase the danger that a fire will escape.

A permit may be cancelled if the burner fails to comply with the conditions of the permit.

Smoke on the road is always a dangerous situation. Individuals should be aware of that danger and work towards reducing this potential hazard. However, smoke that adversely affects others, (usually schools, nursing homes, hospitals, or people who are home bound due to old age or illness) is also cause for revoking a permit.

The AFC understands that ALDOT works with ADEM and other governmental entities to insure compliance with regulation other than those imposed by the AFC.

Many government regulations overlap and cause work over and above the goal of a project. ALDOT is committed to work with the AFC, and others, to comply with the law.

Alabama Forestry Commission

To obtain a Burning Permit or Report a Wildfire

COUNTY	1-800
Autauga	242-2504
Baldwin	672-3076
Barbour	922-7688
Bibb	452-5923
Blount	572-2017
Bullock	392-5679
Butler	392-5679
Calhoun	572-2017
Chambers	492-3711
Cherokee	572-2017
Chilton	242-2504
Choctaw	672-6912
Clarke	672-6912
Clay	492-3711
Cleburne	492-3711
Coffee	922-7688
Colbert	942-3107
Conecuh	672-3076
Coosa	492-3711
Covington	922-7688
Crenshaw	392-5679
Cullman	292-6653
Dale	922-7688
Dallas	242-2504
DeKalb	572-2017
Elmore	392-5679
Escambia	672-3076
Etowah	572-2017
Fayette	452-5923
Franklin	942-3107
Geneva	922-7688
Greene	242-2504
Hale	242-2504
Henry	922-7688
Houston	922-7688
Jackson	572-2017
Jefferson	292-6653
Lamar	452-5923
Lauderdale	942-3107
Lawrence	942-3107
Lee	392-5679
Limestone	942-3107
Lowndes	392-5679
Macon	392-5679
Madison	572-2017

COUNTY	1-800
Marengo	242-2504
Marion	942-3107
Marshall	572-2017
Mobile	672-6912
Monroe	672-3076
Montgomery	392-5679
Morgan	942-3107
Perry	242-2504
Pickens	452-5923
Pike	922-7688
Randolph	492-3711
Russell	392-5679
Shelby	292-6653
St. Clair	492-3711
Sumter	242-2504
Talladega	492-3711
Tallapoosa	492-3711
Tuscaloosa	452-5923
Walker	292-6653
Washington	672-6912
Wilcox	242-2504
Winston	292-6653

2:1:B Grading and Drainage (Removal and Relocation of Structures)

Structures (usually buildings) will be removed from the right of way by one of two methods, either by demolishing the structure and removing the debris or by removal of the structure intact and re-establishing it in a new location. The plans will show for each individual structure which method applies. This work is covered in Section 205 and must not be confused with removal of culverts and other existing facilities as described in Section 206. The work of removal or relocation also applies to all objects associated with the structure, such as out buildings, fences, utility facilities, shrubs, etc. When structures are required to be removed from the right-of-way the contractor, by plan notes, is required to determine if asbestos or any other hazardous material is contained in any of the structures to be removed. If it is determined that asbestos or any other hazardous material exists it shall be removed and disposed of in accordance with all applicable Federal, State and Local regulations. Payment for the removal and disposal of any hazardous material shall be paid for as extra work in accordance with Article 109.04 of the Standard Specification.

Removal of structures that are not to be re-established may be accomplished in any manner selected by the Contractor subject to the conditions outlined in Article 205.03. It should be noted that no salvage of materials or fixtures will be required unless so specified on the plans. Otherwise any materials or fixtures which the Contractor salvages will become his/her property. Special care must be exercised to be sure that the Contractor does not dispose of the debris in a manner that will create an unsightly appearance. Disposal of debris shall be in accordance with Subarticles 106.01(b) and 201.03(e) A check should also be made of all the utility connections. Most municipalities and counties have ordinances governing the closing of sewer connections and the proper disposal of septic tanks. The closing of a septic tank system should be in accordance with the most stringent requirements of either the State of Alabama Department of Health or the County in which the project is located. Any gas or water connection should be disconnected in such a manner so as not to interfere with any future construction. Prior to removal, rodent control should be provided in accordance with appropriate health and safety regulations.

A structure that is to be re-established in a new location must be carefully inspected inside and outside before the Contractor starts the moving work and an accurate record made in writing of its actual condition. In addition to required pictures, and/or videos, sketches showing locations and descriptions of cracks, holes, breaks, etc. should be added to the record where helpful. The purpose of this record of inspection is to determine what damage, if any, was done to the structure in the process of being moved. This written report must be prepared in the manner outlined in Article 205.03. If there is a difficulty in obtaining any of the required signatures, the matter should be taken up promptly with the District Engineer.

To prevent any possible claim by the property owner for damages due to delays, the Contractor should not be allowed to begin moving operations until he/she is prepared and equipped to push the work through to completion without delay. The inspector should see to it that the work is completed without delay. Any unnecessary delay should be noted in the Inspector's diary and reported promptly to the Project Engineer.

In the event that the structure will be moved over or along a State Maintained Highway the contractor or his/her sub-contractor will be required to obtain a Department of Transportation Permit issued through the District Engineer who has responsibility for the area involved.

The building must be re-established on a substantial foundation, which must be at least equal in quality to the original foundation. The inspector should insure that all items which are properly classed as a part of the overall structure unit, such as trees, shrubs, out-structures, etc., are properly taken up, protected and reset, or moved, since this incidental work is included in the bid price for removal of the

overall structure unit. Transplanting of shrubs, trees and lawns are to be in accordance with Section 661 of the specifications.

The Contractor must re-establish the structure at the location and in the manner shown on the plans. The Contractor is not allowed to make any private agreement with the property owner for any other disposition of the structure other than that shown on the plans unless written approval has been secured from the Project Engineer. The Project Engineer must in all cases refer this matter to the District Engineer before issuing any such authority.

After the structure has been re-established satisfactorily and inspected, if the release described in Subarticle 205.03(c) cannot be secured, the Engineer will issue the usual certification to release money due the Contractor. It should be understood that this release does not affect Subarticle 107.14(a) in which the Contractor and his/her surety are made responsible for damage claims of this nature.

Another method of disposal of a structure may be encountered occasionally -where a structure is located partly inside and partly outside the right of way. In this case it may be necessary to cut off at the right of way line the portion of the structure extending inside the right of way. Such situation generally arises from failure to reach agreement with the property owner, and in such situations it can be expected that litigation may be involved. Therefore, before allowing the work of cutting off a structure to begin, the Project Engineer should confer with the District Engineer on the matter and the work should be handled carefully, with the idea constantly in mind that litigation may be involved.

Engineering and Inspection

The contract will provide lump sum pay items for the items of Removal and/or Relocation of Structures. Several structures may be included in these lump sum pay items. However, a breakdown by Structure No. with a bid price for each will be shown in an attachment to the contract bid items. This breakdown is provided in order that structures may be deleted from the total lump sum bid item at an amount equal to the price indicated in the breakdown by Structure Number. In many cases, structures set up to be removed under the contract will be removed by others between the time of contract letting and the time at which the Contractor moves to the project. In these instances, an evaluation must be made, by the Engineer as to the condition of the Structure at the time of bidding and the condition at the time the Contractor is prepared for removal. This evaluation is made by the Engineer to assure himself/herself as to the amount of work required in removal versus the amount of work which would have been required under the original bid amount. At times, the entire structure will have been removed by others in which case the Engineer would delete the entire bid amount from the contract. Partial removal by others requires considerable engineering judgement concerning the possible payment of the total bid price for the structure in question. The removal of minor debris left by others from Structure removal is a subsidiary obligation of in the item of Clearing and Grubbing as covered by GN-2 note.

Photographs and/or videos are very helpful in the documentation of the amount of work required in the removal of a structure. If others have removed the entire structure, a dated photograph or video of the building site where the structure previously existed will be helpful in defending the State's position in the deletion of payment for the removal of the structure.

Project personnel should always be alert for third party agreements in the removal and/or relocation of structures. If other than Prime Contractor personnel become involved in Structure Removal after the "Notice to Proceed" has been issued, the Engineer should insure that contract procedures are being followed in documenting the performance of such work either by Subcontract or Rental Agreement. If the Contractor attempts to make a private agreement with the Property Owner for the Removal and/or Relocation of a Structure, the Engineer must document in writing and receive approval for any such

agreements. Generally these type arrangements will not be allowed, but in any case, prior to making payment for removal and/or relocation, we must assure that the Contractor has properly performed the full amount of the contract item and has satisfied all Right of Way Agreement concessions between the Property Owner and the Department of Transportation.

In the relocation of a structure, a structure release must be obtained from the Property Owner by the Contractor after relocation. **(See Suggested Form of I:3:C:I.2, Structure Release)**

2:1:C Grading and Drainage (Removal of Miscellaneous Existing Drainage and Other Facilities)

Before this work is begun the Inspector should check the plans carefully to determine the items or locations where materials are to be removed and salvaged. Locations where portions of structures are to be retained and extended should be noted. These locations should be checked with the Contractor so that there will be no misunderstanding as to where salvage or the partial retention of structures will be required. Salvage will not be required unless so indicated on the plans. For miscellaneous facilities, normally the only items marked for salvage will be pipe culverts, guardrail and guardrail items. Bridge structures planned for salvage, depending on the type and condition, will generally be indicated on the plans.

Where salvage is required or a part of a structure is to be retained, the Inspector should be on the site during the salvage operations to make sure that proper care is being used in salvaging. Salvaged materials may be designated for storage on the right-of-way to be picked up by State Forces at a later date, designated for transporting by the Contractor to a designated State Storage Yard or designated for reuse on the project in progress.

Before beginning any removal that would interfere with traffic, provisions must be made to properly handle traffic through the work site. The Engineer should insure that this has been done before permitting the Contractor to begin any work, which would otherwise cause interference with traffic.

If the Contractor places broken concrete or other suitable waste material from removal operations into a fill area, the material should be carefully spread in layers and with pieces far enough apart that no voids will be left. The Inspector must not permit porous areas surrounded by non-porous material that would trap water. If it is desired that broken concrete be stored for later use as rip rap, etc., the Contractor should be directed where to store this material. Any such material used later will be paid for again under the pay item for which it is used unless shown otherwise on the plans or in the proposal.

The reasons for removal of miscellaneous existing facilities would include:

(1) Conflicts with construction features of the project in progress,

(2) Insufficient strength to support higher embankments, etc.

The material excavated in removing the structure must be replaced and compacted as directed as a part of the work included in the unit price for removal of structure. Additional backfill material needed to bring the backfill up to the specified level will be paid for at the unit price of the material used.

Where designated on the plans or in the proposal to be salvaged, all sound materials having salvage value shall be carefully removed without undue splitting or breakage and all bolts, nails, etc; shall be removed therefrom. The use of equipment or facilities, which might damage members or portions of the structure to be salvaged will not be permitted. Any damage to material to be salvaged should be recorded in the inspector's daily report.

No salvaged material shall be used in the construction of the new work, except where so provided on the plans or in the proposal. The Contractor shall not make temporary use of any materials or parts from old structures without the written permission of the Engineer. Any materials and parts so used shall be left at a designated point at the same site and in substantially the same condition in which they were when removed from the old structure.

Structural steel, timber or other salvable material removed from old structures, unless otherwise specified or directed, shall be stored in a neat and presentable manner on blocking at designated locations within the right of way. Structures or portions thereof which are specified on the plans or in the proposal to be salvaged for re-erection shall be stored in separate piles.

Special attention is directed to handling of salvaged bridge materials in that steel superstructures and frames, unless otherwise provided, shall be match-marked and dismantled in an approved workman-like manner and removed carefully so as to avoid damage.

Guardrail designated for salvage shall be carefully dismantled in condition for re-erection and rail, cable, hardware and posts stored as directed at accessible points for removal. Cable shall be rolled or spooled in suitable condition for hauling.

When the plans or proposal do not provide for the salvaging of material from existing roadway or bridge structures designated for removal, all materials from such become the property of the Contractor. These materials may be removed or disposed of by methods of his/her selection provided such does not conflict with other requirements of the specifications or will damage any existing work or facilities to be incorporated into the work.

Engineering and Inspection

If no direct pay items are provided for the removal of certain items listed in Section 206 of the Standard Specifications, removal of such items will be a subsidiary obligation of the other items of work.

In some cases complete removal of the structure may not be required if it can be properly broken up in-place and all voids properly filled. Prior to allowing this method of removal, the Engineer should assure himself/herself that the material left in-place would not interfere with bridge piling, drainage structures, utilities or any other construction feature to be installed.

Measurements of items removed should be made daily by the Engineer and recorded in the daily inspector's report or appropriate field book.

2:1:D Grading, Roadbed and Roadside Requirements

2:1:D:1.1 Excavation and Embankment

Description of Work.

After Clearing and Grubbing of a given area has been accomplished to the satisfaction of the Engineer, grading of the project will begin. This grading operation will generally be conducted concurrently with the laying and pouring of drainage structures.

Unstable Material and/or Muck Excavation

Prior to placing embankment the inspector should properly inspect the underlying material to assure that it will provide adequate foundation for the embankment to be placed. If not, the unstable material, or material classified as "Muck Excavation," should usually be excavated to a depth directed by the Engineer and disposed of as ordered. Considerable experience is required in determining the amount of unstable material to be removed and the Engineer must consider all factors including the height of embankment to be placed. In some cases it may be possible to "bridge over" the unstable material in lieu of undercutting.

To be classified as "Muck Excavation," the unstable material must be such that it has to be excavated by specialized equipment other than conventional equipment such as scrapers and dozers. The Contractor generally incorporates the use of a dragline, dredge or similar equipment, which operates outside the area being excavated, but other equipment may be considered as "specialized" if the operation required is in excess of a normal grading operation. (If no item of "Muck Excavation" is provided in the contract, the unstable material will be classified as "unclassified excavation" regardless of the method employed in removal). Payment will be made in accordance with Item No. 210.10(a)1.

The method of disposal of unstable material should be discussed with the Contractor prior to removal. Several alternatives for disposal are as follows:

(1) If the unstable material is needed for later use in the flattening of slopes or for topsoil and is ordered stockpiled by the Engineer at the time of excavation, the second handling of the material will be paid for under the appropriate item of Unclassified Excavation or Topsoil from Stockpiles.

(2) If the Engineer sees no future need for the unstable material, he/she should order the material disposed of at the time of excavation. The contractor may elect to cast the unstable material just outside the construction limits for disposal at a later date. When the Contractor is prepared for disposal, he/she may request to dispose of a portion of the material within the right-of-way in the flattening of slopes or as a substitute for topsoil. If the Engineer feels that such method of disposal can be accomplished without damaging the project structurally or aesthetically, he/she may allow such disposal but no payment for the second handling will be made.

(3) If the Contractor elects to waste the unstable material beyond the project limits all required permits and clearances should be verified by the Engineer prior to its disposal.

The backfilling of areas where unstable material is excavated will be performed with select material from cut sections on the project or borrow material. Where water accumulates in the excavated areas, unclassified excavation or borrow excavation meeting the requirements of underwater backfill or underwater embankment (Article 210.02) will be used. During this backfilling operation, the Contractor

should avoid the trapping of water and mud beneath the backfill by forcing these materials ahead as backfilling progresses.

Topsoil

Generally, and in accordance with directives of the Engineer, the existing topsoil beneath fill areas and in cut sections will be stripped within the construction limits and stockpiled for later use in the top-soiling of slopes to accommodate grassing. Generally, approximately four inches of topsoil will be required and the Engineer should have some estimate of topsoil requirements for the project prior to stockpiling. As stockpiling progresses, a periodic check of stockpiles will indicate when this estimated requirement is being reached and thus prevent the over stockpiling of topsoil. Usually if the natural topsoil thickness approximates four inches, it will be necessary to strip all cut and fill areas for stockpiling. Certain surplus stockpiles may be left in selected areas when dressed and grassed for later use in maintenance operations.

Excavation and Embankment

After unstable material has been excavated and/or topsoil stripped from beneath fill areas, the major operation of embankment construction will begin. Embankments in areas where drainage structures are required will be constructed as a first operation so that pipe laying and box culvert construction can also begin.

The method and type equipment employed in excavation and embankment construction will be at the Contractor's discretion pending satisfactory results and will vary with the materials encountered.

Equipment used in soil excavation and embankment will usually consist of scrapers, dozers, tandem trucks, front-end loaders and rollers. The basic type rollers used in embankment compaction will be either a "sheepsfoot" or "grid" roller.

Rock excavation and embankment construction will require the use of "rock wagons," rock drills and explosives.

Excavation operations should begin at the previously established slope stake and progress downward along the designated slope line to the subgrade elevation. During excavation the indicated slope ratio should be maintained as excavation progresses. In rock excavation, "If specified by the plans" "Pre-splitting" with the use of light explosive charges along the specified slope will be required for slopes steeper than one to one. Excavation thus removed will be hauled to the embankment area, either in tandem trucks, "rock wagons" or scrapers, and deposited in layers of thickness specified in Item 210.03(d)2.

During the excavation operations, the Engineer should always be alert to reserve select materials (Item 210.03(b) 3 for use as improved roadbed or topping material of embankments. Stockpiling of these materials for rehandling payment should be performed only when absolutely necessary. Operations should be conducted such that embankment areas are prepared to receive improved roadbed material or topping material as it is being excavated from the cut areas.

The formation of embankments will begin at the toe of the fills as established by pre-set slope stakes. Layers of material will be deposited full width of the roadway embankment and compacted prior to placing a succeeding layer. As the embankment construction progresses the slopes on each side should be maintained to the specified slope ratio. Maintenance of these slopes as the embankment increases in height will prevent the roadbed from being too wide or too narrow when subgrade elevation is reached.

Maintenance of the slope will also expedite the placement of topsoil and grassing of the slope immediately after subgrade elevation is reached.

During the embankment construction the Contractor should provide adequate personnel, usually laborers, for surveillance of the fill area removing roots and other objectionable materials hauled in with the excavation materials. These roots and vegetation should be cast from the fill area and properly disposed. The inspector should be reasonable concerning the appropriate disposition of small stringy roots and fibers less than one inch in diameter in ordinary quantities.

The Contractor should keep the embankment area dressed and sloped at all times in order to provide good drainage during periods of rain and also to facilitate and insure good compaction efforts on a uniform surface. Cut sections should also be bladed and sloped to properly drain at the end of work each day to lessen the infiltration of water during periods of rain.

When embankment is to be placed on side hills, the natural hill slopes should be benched prior to placing embankment materials in order to properly "key" the fill. This procedure will prevent a slippage plane from being formed, which could later develop into slide areas.

The inspector should give special attention to the undercutting of grade points between cut and fill areas as detailed on plan drawings. In these areas the Engineer should also give special attention to the transition of front and back slopes from the cut section into the fill section. It is highly desirable to begin flattening the front slope approximately 200 feet prior to reaching the fill area. This procedure will tend to push the ditch away from the fill slope toe and prevent the depositing of water immediately at the toe. Also in this 200 feet area the cut back slope should be flattened to provide a rounded transition into the fill section.

During the course of a construction project, slides may sometimes develop in cut back slopes or in fill sections. Any surplus material required to be removed from the slide area will be paid for under the item of unclassified excavation unless specialized grading equipment is required in order to protect previously constructed roadbed or drainage facilities. If specialized equipment is required, a price adjustment may be justified. Payment will be made by Force Account or Supplemental Agreement. Minor slides can generally be corrected by the flattening of the slope. Extensive slides may require major items for correction such as benching, rock buttresses, retaining walls, etc. in which case the Geotechnical Section of the Bureau of Materials and Tests should be contacted for appropriate investigation.

Borrow

On some projects, sufficient material may not be available for the construction of required embankments. It may be possible for the Engineer to acquire additional material from within the Right-of-way by the flattening of back slopes, widening of cuts by extending a flat front slope to the ditch line or placing a berm area between the back of ditch and bottom of cut back slope or by lowering grades, where possible, in cut sections. Changes in typical sections dictate quantity changes in other items such as pipe lengths, riprap, unclassified excavation, etc.; therefore, a cost comparison of effected items against the cost of additional borrow should be examined to determine the cost effective method for changes of this type.

If it is known prior to contract letting that sufficient material is not available on the project, the item of Borrow Excavation will be set up. Borrow is secured beyond the right-of-way limits from sources indicated on the plans or provided by the Contractor. Contractor selected sources must be approved by the Engineer prior to use. Considerations in approval would be to assure that the material meets the

requirements of Subarticle 210.02(c) for the intended use, that the location of the pit will not present an unsightly appearance to the project, that adequate erosion control measures are provided in the Contractor's request for approval, and that the pit will not produce future maintenance problems for the Department. All required permits and clearances should be verified. In general borrow should not be used until all of the available unclassified excavation has been exhausted. If the Contractor does request to haul borrow to the project prior to completing all unclassified excavation and such borrow results in the wasting of unclassified excavation, the amount of such waste shall be deducted from the final quantity of borrow excavation

Waste

On some projects, the available unclassified excavation will exceed the quantity of embankment material needed to complete the project resulting in the wasting of unclassified excavation. Excess material should be used in the flattening of slopes in so far as possible. The wasting of material, which would change typical sections and increase the quantities of other items on the project, should be considered. The remainder that can not be feasibly used on the project will be wasted outside the right-of-way. The construction plans will sometimes designate available waste areas. If not designated, it will be the Contractor's responsibility to locate and request approval of a waste area. In either case, the Engineer should assure himself/herself of the following:

(1) The location of the waste area and manner in which the material is wasted should be such that it will not present an unsightly appearance to the project.

(2) That permission has been secured by the Contractor from the property owner for the wasting of material.

(3) That the Contractor's request provides measures for adequate erosion control of the waste area.

(4) That all required permits and clearances, Subarticle 106.01(b), have been obtained.

Engineering

Prior to the Contractor beginning work, project personnel should have completed the work of taking original cross sections. Division or project personnel will have plotted these original sections manually or by computer. Preliminary cross sections will be provided in the construction plans, but the Project Engineer responsible for documenting pay quantities should verify the accuracy of these sections with his/her independent review. Roadway sections will have been plotted on the original sections and earthwork quantities established. During this stage the Engineer should re-check for adjustment to slopes, if necessary, to achieve an economical balance between safety and maintenance features and at the same time provide a balance, if possible, between cut and fill requirements. During the balancing procedure the Engineer should be aware of the unclassified excavation which must be used in the backfill of muck excavation, backfill of stripping of topsoil beneath fill areas and topsoil stripped from cut sections which will not be used in embankment construction.

After an area of the project has been cleared and grubbed, slope stakes should be established. The Engineer should assure himself/herself that project, as well as the Contractor's, personnel clearly understand the slope stakes as written.

During the first operations of muck excavation and stripping of topsoil beneath fill areas, the Engineer will be responsible for cross sectioning the excavated areas prior to the placement of backfill or

embankment. He/she should insure that this excavation is within the designated limits. If proper control elevations have been established along the project in the form of benchmarks and R/W hub elevations, these necessary cross sections can be taken quickly without interfering with the Contractor's operation.

As excavation and embankment construction progresses, the Engineer will want to periodically check the slope ratios of cuts and fills to assure himself/herself that the Contractor is adequately maintaining them.

At the time of each monthly estimate, the Engineer should verify the approximate cubic yardage of excavation for which payment can be made. This quantity should be established by the taking of periodic cross sections through the cut areas.

As cut and fill sections approach subgrade elevation or sub-subgrade elevation, where improved roadbed is provided, a graded centerline should be established to aid the Contractor in establishing the required typical section with greater accuracy than can be obtained by coming all the way from the slope stake elevation. This graded centerline should be maintained and used by the Contractor to obtain the required subgrade elevations prior to scarifying for roadbed processing.

After the roadbed processing of the subgrade or after each layer of improved roadbed, where provided, "Grade Hubs" (Blue-tops) for the finish grading of the roadbed must be provided.

Immediately after the roadbed has been graded to subgrade or sub-subgrade, where improved roadbed is required, the Engineer should take his/her final cross sections for the establishment of the final excavation quantities.

Other engineering responsibilities during the grading process are as follows:

(1) The cross sectioning of topsoil stockpiles.

(2) The cross sectioning of muck excavation stockpiles if payment is to be made on re-handling.

(3) The cross sectioning of borrow pits for monthly and final payment quantities.

Inspection

The following checklist is established for use of the inspector in reviewing excavation and embankment operations:

1. Density Control.

(a) Have adequate preliminary samples been taken for laboratory proctor densities to cover the type materials being hauled?

(b) Have Procter Density samples been adequately described according to soil type, texture and color. (The grade inspector may wish to maintain jar samples of materials, which are tagged with the Laboratory density. This will aid in using the correct proctor density for each in-place density taken.)

(c) Are in-place densities being taken at required job control frequency as specified in ALDOT Testing Manual?

(d) Are in-place densities being recorded in plan and elevation views to insure proper distribution of compactions?

(e) Is hauling equipment adequate for the fill area being constructed? (Frequency of job control densities per ALDOT Testing Manual)

2. Are roots being properly removed from fill area?

3. Is compaction equipment adequately rolling the extreme edges of embankment? (Important to provide a firm slope to aid in erosion prevention)

4. Does the Contractor adequately maintain cut and fill slopes?

5. Is benching being performed on side hills and have these benches been cross-sectioned for payment? No payment is required for benching to "Key" new fill into existing embankments.

6. Are areas of underground seepage being noted and recorded for possible underdrain installation?

7. Has backfill been placed, according to Subarticle 530.03(e), over drainage structures over which hauling is occurring?

8. Does underwater backfill and embankment meet specification requirements? Are samples being tested in accordance with frequency of ALDOT Testing Manual?

9. Have CBR and Soil Analysis samples been picked up for subgrade in accordance with frequency of ALDOT Testing Manual?

10. Has thickness of improved roadbed layers been checked at specified frequency and recorded?

11. Have subgrade or sub-subgrade "Grade Hubs" (Blue -Tops) been checked and string-lined? (The subgrade should be string-lined prior to performing roadbed processing to insure that ample material will be available after mixing to obtain the proper typical section and retain the full depth of the processed layer. Where improved roadbed is to be placed the sub-subgrade should be string-lined to insure adequate thickness of the improved roadbed layers to follow.)

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2:1:D:1.3 Grading and Drainage (Grading, Roadbed and Roadside Requirements) "Roadbed Processing"

Description of Work

The item of Roadbed Processing will be performed on each layer of improved roadbed placed above sub-subgrade elevation. Where improved roadbed is not provided, the item of Roadbed Processing will be performed on the top six inches of material below subgrade elevation in both cut and fill sections.

Basically the item of Roadbed Processing, whether performed on improved roadbed material or the top six inches of existing material, will consist of scarifying, mixing until uniform in color and texture, compacting to a higher density than normal embankment layers at a specified moisture content and shaping to the required typical section within specification tolerances.

Prior to scarifying the existing material or placing the first layer of improved roadbed, the subgrade or sub-subgrade should be checked to be generally within the same surface requirements as will be required for the finished processed layer. This check is necessary to insure that the specified thickness of improved roadbed material is obtained, and where improved roadbed is not required, this check insures that the full depth of the processed six inches will remain after "blue-topping" with only minor "clipping" required.

Equipment used in the performance of Roadbed Processing will be at the Contractor's discretion pending satisfactory results. Basic equipment will consist of motor patrols with scarifying teeth, processors, disc, rotary mixers, water trucks and rollers. Rollers will be sheepsfoot, grid, steel wheel or rubber tired depending on the type material being compacted. In the processing of a six inch layer, after mixing, the material will be "pulled in" and compacted in thin layers (two to three inches) until the full six inch layer has been compacted. During mixing and compaction, water will be added to bring the material within ± two percent of optimum moisture content. The top of the processed layer will be sealed to a smooth surface with the use of a rubber-tired or steel-wheeled roller.

After the "Grade Hub"(Blue-Top) elevations have been established on the processed layer, the Contractor will "Clip" the layer with a motor patrol to the "Grade Hub" (Blue-Top) elevation.

Engineering

Prior to placing the first layer of improved roadbed or scarifying the existing cut or fill material, the Engineer should make a general overall check of the roadway surface to insure that it basically conforms to the preliminary elevation established by the Contractor from the centerline grades set by the engineering party. Spot checks should be made with the template and string line to insure that high and low places do not exist between the grade hubs.

After the roadbed has been processed six inches deep or the first layer of improved roadbed placed, "Grade Hub" (Blue-Top) elevations will be established at the centerline, edge of paving, intermediate crown-lines and shoulder on the surface of the finished roadbed.

The completed roadbed layer will be measured for payment by flat chaining parallel to the surface of the processed layer in 100-foot roadbed stations. Payment will be made under the item of "Roadbed Processing" in 100-foot stations for each layer of improved roadbed placed, or in 100-foot stations for the processing of six inches of existing materials, where improved roadbed is not provided. Separate payment will be made under the appropriate item of Unclassified Excavation or Borrow for the furnishing of material for improved roadbed.

Inspection

The following checklist is provided as an aid in reviewing the item of Roadbed Processing:

1. Did the existing roadbed basically meet template and string-line requirements for Roadbed Processed Layer prior to scarifying or placing the first layer of improved roadbed?

2. Did existing roadbed have 95% of T-99 density prior to scarifying or placing first layer of improved roadbed?

3. Is the processed layer uniform in texture and color?

4. Has water been added to bring layer within ± two percent of optimum moisture?

5. Have Proctor Density standards for the processed material been established in accordance with frequency of ALDOT Testing Manual?

6. Have in-place densities of processed layer been taken in accordance with frequency of ALDOT Testing Manual?

7. Has thickness of improved roadbed layers been checked and recorded in field book according to frequency of ALDOT Testing Manual?

8. Does completed surface meet the requirements of Subarticle 230.03(e) and have measurements to template and string line been made. A statement as to the stations checked and condition of the section should be made in the Daily Inspector's report.

9. Does all improved roadbed material pass the four inch sieve, and if borrow, does it meet other requirements of Item 210.02 (c) 2.

2:1:D:1.4 Grading and Drainage (Grading, Roadbed and Roadside Requirements) "Stabilized Roadbed"

Description of Work.

The stabilization of the finished subgrade is usually accomplished with the use of local or commercial aggregates as specified in the plans or proposal or by the use of a lime treatment. The purpose of the stabilization is to increase the strength of the subgrade material and thus reduce the depth of required base and pavement structure. Lime stabilization also provides the desired workability in the subgrade material for obtaining a satisfactory roadbed.

Aggregate Stabilization

The work of aggregate subgrade stabilization will consist of the spreading of local or commercial aggregate to the required thickness, incorporating this material with the underlying subgrade, compacting to the required density and shaping to the specified typical section.

Prior to spreading the plan specified depth of aggregate stabilizing material, the subgrade, which has previously been placed to the requirements of Section 210 will be scarified generally with the use of scarifying teeth provided on the motor patrol. The Contractor will then spread the specified thickness of stabilizing aggregate onto the scarified subgrade through the use of approved spreading equipment. The spreading equipment must be capable of accurately controlling the depth of material spread since the payment for the stabilized layer will be based on the tons or cubic yards of stabilizing material placed.

After spreading operations are completed, the aggregate will be thoroughly mixed with the subgrade until the mixture is uniform in color and texture. Mixing equipment will generally consist of the combined use of motor patrols, discs, and rotary mixers. Water trucks will be used to add water to the stabilized layer during mixing.

Compaction will consist of pulling the mixed layer into place in small increments and compacting continuously until the entire layer has been compacted.

Lime Stabilization

The roadbed will be prepared to the subgrade elevation through normal embankment construction (95% of AASHTO T-99) prior to the addition of lime.

Prior to the spreading of lime, the subgrade will be scarified to the depth of required stabilization, pulverized and oversize particles (larger than three inches) removed. The lime will then be spread generally from a tank truck in the form of a dry or slurry application. Slurry treatment will usually be limited to urban areas. The tanker will make successive passes over the measured section receiving the treatment until the desired rate of lime has been spread. The dry application of lime will be forced from the tanker through spray bars using compressed air or will be "augured" out the back of the tanker.

After spreading, the lime will be uniformly mixed into the subgrade with the use of rotary mixers, discs and motor patrols. Water will be added during the mixing operation and mixing continued until all material will pass a three-inch sieve.

After mixing, depending on the class treatment being applied, the mixture will either be compacted to specified density or sealed with a light roller and allowed to mellow for a minimum period of three days, but not to exceed twenty-one days.

After the mellowing period for a Class "1" or "2" treatment, the stabilized material must be mixed until 100% of the material, exclusive of gravel and stone, will pass a two inch sieve and 60% will pass a No. 4 sieve. For a Class "1" treatment the second increment of lime will be added during the second mixing operation.

During the mixing, mellowing and compacting operations, it is imperative that adequate moisture be provided in accordance with specification requirements. After compaction the completed layer must be kept moist until covered by the next overlying layer.

Engineering.

Aggregate Stabilization

The construction plans will specify the depth of aggregate to be used in stabilization and the depth to which this aggregate is to be mixed with the underlying subgrade. The resulting thickness of the compacted mixture will also usually be specified on the construction plans. The Engineer should be alert to any variance from the anticipated stabilized layer thickness during the first section stabilized. From the thickness results of this first section, the Engineer may wish to adjust succeeding grades if the differential can not be taken care of in the base and paving layers and still remain within specification tolerances.

Prior to stabilizing, the "Grade Hub" (Blue-Top) elevations will have been established for finishing the "Roadbed Processed" layer to plan typical section.

After the stabilized layer has been compacted, the "Grade Hub" (Blue-Top) elevations will be established at the centerline, intermediate crown-lines, edge of paving and shoulders for final finishing of the layer to plan typical section.

Lime Stabilization

Prior to the spreading of lime, control grade stakes should be established adjacent to the edge of each side of the layer to be treated to aid in the checking of the scarified depth.

From the specified percent lime treatment, standard density, and measurements of area to be treated, the Engineer can compute the quantity of lime to be added as follows:

Example

Specified % lime - 3% by weight
Standard density of material being treated (T-99) - 100 #/ft.^{3}
Length of area to be treated - 1000 ft.
Width of area to be treated - 30 ft.
Depth of specified treatment - 6 in.

Compacted volume to be treated = (l000)(30)(0.5)
=15,000 ft.^{3}

Wt. of lime to be added = (15,000 ft.^{3})(l00#/ft.^{3})(.03)
= 45,000 Lbs. of Lime

Form BMT-78 and Table shown on **Form BMT-79** should be used to facilitate the above computations.

After the layer has been processed and compacted, "Grade Hubs" (Blue-Top) elevations must be established for final finishing to plan typical section.

Prior to covering with the next overlying layer, the Engineer will be responsible for measuring the area receiving the lime treatment.

Inspection.

Aggregate Stabilization

The following checklist is provided as an aid in inspecting this item of work:

(1) Has subgrade surface to be stabilized been shaped and compacted to the requirements of Section 210?

(2) Have local sources for stabilizing materials been approved by Bureau of Materials and Tests?

(3) Is stabilizing aggregate being shipped from a commercial source participating in the Quality Control Program for aggregates? If so, are shipments accompanied by **Form BMT-I0**?

(4) Are **Form BMT-10** or certified weighmaster tickets adequately documenting tonnage quantity for payment? Is certificate of weighmaster on file? If payment is to made be by the cubic yard, have hauling vehicles been measured and measurements recorded? Are cubic yards hauled being double validated on **Forms C-7-C** and **C-22-C**? Is ticket for aggregate measured and paid by the ton signed by a qualified weighmaster and validated by the Project Field Inspector?

(5) Is the depth of aggregate spread being controlled accurately by the spreading equipment?

(6) Is the mixing equipment providing a mixture, which is uniform in color and texture?

(7) Have Standard Density samples been picked up for the mixture in accordance with frequency of ALDOT Testing Manual for the establishment of P.D.'s?

(8) Have in-place densities been checked in accordance with frequency of ALDOT Testing Manual?

(9) Has surface of stabilized layer been checked for string line and template requirements as per Section 230 and measurements recorded in a field book?

(10) Is the surface and density of the completed layer being maintained until covered by the next overlying layer?

Lime Stabilization

The following checklist is provided as an aid in inspecting this item of work:

(1) Has the subgrade been prepared in accordance with Section 210? (95% of AASHTO T-99)

(2) Has subgrade been string-lined and checked with a template prior to scarifying to insure that full depth of lime stabilization is retained after "blue-topping?"

(3) After initial scarifying and pulverizing, has all material retained on a three inch sieve been removed?

(4) Is lime being incorporated to the specified plan percentage within ± 5% of the quantity required for a given section? (Complete, **Form BMT-78** using **BMT-79**) Rate of application should be checked in accordance with frequency specified in ALDOT Testing Manual

(5) Is the mixing operation beginning within six hours of spreading?

(6) Does the mixing equipment provide a homogeneous mixture?

(7) Is excessive lime being lost through windy conditions?

(8) After initial mixing, does all material pass the three-inch sieve?

(9) For Class "1" and "2" stabilization, is final mixing being performed within the 3-21 day mellowing period?

(10) After final mixing, does 100% of the material by dry weight, exclusive of gravel and stone, pass the two-inch sieve and 60% pass the No. 4 sieve? Are pulverization tests being run in accordance with frequency specified in ALDOT Testing Manual?

(11) Is adequate watering equipment provided during mixing operation? Is moisture content being maintained within ± 2% of optimum during compaction and until covered by next overlying layer?

(12) Has the water being used been tested?

(13) Has lime been pre-tested? If not, are two - 1/2-gallon samples being taken from each tank truck or RR car, with one submitted for testing and one retained?

(14) Is the weight of each lime shipment adequately covered by certified weight ticket? Is copy of weigh master certification on file?

(15) Have standard densities before and after stabilization been picked up for each mixing section?

(16) Have in-place densities been taken in accordance with frequency of ALDOT Testing Manual?

(17) Has completed surface been string-lined and checked with template to meet surface requirements of Section 230?

(18) Have compacted depths of stabilization been checked in accordance with frequency of ALDOT Testing Manual and been recorded in a field book? (Phenolphthalein can be used for spraying the sides of the core hole and provide a color differential in the treated layer thickness to facilitate measurements)

(19) Has the contractor used adequate safety precautions in the handling of lime as required by OSHA or Special Provision?

2:1:D:1.5 Grading and Drainage (Grading, Roadbed and Roadside Requirements) Surcharge Material (Settlement Plates)

Description of Work.

Surcharge Material

Surcharge material is embankment material placed on a fill which has previously been completed, for the purpose of adding additional weight in order to get a fast settlement of the fill area. All fills usually settle a certain amount after construction; however, in wet swampy areas the settlement will be more pronounced. Therefore, surcharge material is occasionally placed on fills constructed in these areas in order to get as much settlement as possible in a short time period.

Surcharge material will consist of unclassified excavation or borrow excavation as provided by the specifications and plans. The surcharge fill will be constructed above the subgrade elevation in accordance with Subarticle 210.03(d) to the height specified. After it has been determined that the fill has settled a sufficient amount to allow the placement of succeeding base and paving layers, (usually after a period of 6-12 months will obtain the desired settlement) the surcharge material will be removed. Removal will usually be performed in the contract to follow, but may take place in the present contract, if specified. Payment for removal will be made under the appropriate contract item.

Settlement Plates

The amount of settlement of a fill area is determined with the use of Settlement Plates installed in accordance with specifications and plan details. In most instances, fill areas, where settlement plates are to be installed, will also receive surcharge material. The settlement plates are placed as a means of determining the rate and amount of fill settlement.

Details for the placement, removal, etc. are explained in the specifications, special provisions and/or special drawing contained in the construction plans. The settlement will be monitored with level readings taken daily during the placement of embankment and surcharge material with daily readings continuing one week after all surcharge material has been placed. After all surcharge material has been in place for one week, readings may be taken on a weekly basis, unless otherwise requested. Level readings will continue until it is determined that adequate settlement has taken place. If the rate of settlement exceeds 0.05 foot per day during the placement of embankment and/or surcharge materials, the Central Office should be contacted for consultation. Generally, fill construction will be discontinued until such time as the rate of settlement decreases below 0.05 foot per day.

Extreme care must be given for the adequate protection of each settlement plate installed. Once a plate or riser pipe is damaged or destroyed, it will be virtually impossible to re-establish the assembly to its original position or elevation.

Engineering.

The Engineer will be responsible for assuring that the cubic yards of material (unclassified excavation or borrow) being used in the embankment and/or surcharge construction are accurately documented with original and final cross sections.

During and after the placement of embankment and surcharge materials, the Engineer will be responsible for making daily or weekly level readings, as required. These readings must be maintained in a level book which specifically identifies each settlement plate, its location, date of original placement,

date and results of each level reading. This information is to be reported on **Form BMT-23** (copy included in this unit) with forms submitted to the Division once each week for appropriate distribution to the Bureau of Construction and Bureau of Materials and Tests.

Depending on the contract requirements for payment of the removal of surcharge material, the Engineer will be responsible for assuring that the quantity removed is documented by field cross sections.

Inspection.

The following checklist is provided for the inspector as an aid in checking the construction of surcharge materials and settlement plates:

(1) Are adequate Standard Proctor Densities on file representing the embankment and surcharge materials being placed?

(2) Are in-place densities being taken in accordance with specified frequency of ALDOT Testing Manual?

(3) Are the settlement plate assemblies being installed in accordance with plan and specification requirements?

(4) Have test reports been received on materials used in the settlement plate assemblies?

(5) Is the Contractor exercising the necessary caution in protecting the settlement plate assemblies from damage?

BMT-23

2-13-59
REVISED 7-14-76

STATE of ALABAMA
HIGHWAY DEPARTMENT
Bureau of Materials and Tests

Geotechnical Section

Settlement Plate Measurement

PROJECT No. _____ SETTLEMENT PLATE No. _____

COUNTY _____ LOCATION _____

DIVISION _____ DATE SET _____

LAST REPORT

PLATE ELEVATION _____ DATE OF MEASUREMENT _____

THIS REPORT

PLATE ELEVATION _____ DATE OF MEASUREMENT _____

CHANGE IN ELEVATION (ΔE) _____ TIME INTERVAL (ΔT) _____

RATE OF SETTLEMENT (FEET PER DAY) $\frac{\Delta E}{\Delta T}$ _____

ERROR OF CLOSURE OF LEVEL LOOP _____ LEVELMAN _____

ELEVATION OF COMPLETED SURCHARGE (AT THIS PLATE) _____

ELEVATION OF FINISHED GRADE (AT THIS PLATE) _____

ELEVATION OF FILL AT TIME OF MEASUREMENT _____

TOTAL ACCUMULATED SETTLEMENT TO DATE _____

REMARKS: _____

_____

_____

_____

_____

DATE _____ PROJECT ENGINEER _____

2:1:D:1.6 Grading and Drainage (Grading, Roadbed and Roadside Requirements) "Special Protection for Rock Slopes"

Description of Work.

Normally a solid hard rock slope needs very little work or maintenance. But if the rock is fractured, indicates pop outs, or appears to be susceptible to excessive differential weathering, then some type protection should be applied to protect the public and to prevent future maintenance problems.

Some methods of special protection for rock slopes now in use are as follows:

Rock Bolting

The principal function of rock bolting is to reinforce and support partially detached (loose), thinly laminated, or otherwise incompetent rock that would be subject to failure under the action of gravity. The type anchor bolt (slotted expansion, groutable, etc.) to use will generally vary depending upon the type rock and what has proven satisfactory in the geographical area in which the work is being performed. The size bolt to use should be designed based on the density of the rock, spacing of the bolts, etc. The Central Office is available to assist in this design. Rock bolts are produced by a number of manufacturers in a variety of forms, but the principal features are the same: a bar, an anchoring device, a bearing plate, and facilities for placing the bolt in tension. Some of these bolt types are described below:

Slotted-type bolts - The slotted-type rock bolt assembly (Figure 1-A, Sheet 6 of 8) consists of a steel bolt threaded on one end and a slot cut in the other end, a wedge, a bearing plate, and a nut and washer. The bolt assemblies are installed by first drilling a one inch diameter hole, when a one inch bolt is to be used, to a depth two inches less than the bolt length. The wedge is placed in the slot and the wedge slot end of the bolt rammed into the bolt hole by hand, thereby securing an initial anchorage. Then the bolt is driven over the wedge. The bearing plate, washer, and nut are placed on the threaded end and the nut tightened with an impact wrench to a predetermined torque. For slotted-type bolts the proper hole length must be such that when the bolt is properly driven over the wedge, enough of the threaded end of the bolt should extend from the hole to allow for the bearing plate and nut (two to four inches). Except for drilling the bolt hole to the proper depth, the procedure for installing slotted-type bolts is not critical; however, the bolt will drive over the wedge easier and optimum anchorage will be obtained if the hole diameter is not less than 1¼" or greater than 1-5/16". Proportionate adjustments to these dimensions must be made for bolt diameters different than one inch.

Expansion-type bolts - The expansion-type bolt assembly consists of a headed bolt (Figure 1-B, Sheet 6 of 8) which is threaded onto an internally tapered one or two piece shell containing a mating tapered plug (nut). Tightening the bolt causes the shell to expand and effects an anchor.

In the installation of expansion-type bolts, the bolt hole diameter is critical and should not exceed the manufacturer's recommended value (usually the ideal diameter is one in which the shell will just pass). The assembly is placed in the hole and tightened with an impact wrench. The length of the hole is not critical provided it is longer than the bolt.

Expansion-shell bolts are especially well adapted to routine bolting, although they are not as strong and are more subject to anchor slippage than slotted-type bolts.

Williams Groutable rock bolts - The Williams groutable rock bolt consists of a hollow-cored high-strength alloy steel reinforcing bar, threaded on each end. An expansion shell anchor is attached to one end, and a nut and bearing plate to the other end (Figure 2, Sheet 7 of 8). To install, the bolt and

anchor are first inserted in the bolt hole and torqued to set the anchor. The bolt is then removed (leaving the anchor in the hole), a plastic grout tube is taped to the bearing plate end of the bolt, and the assembly re-threaded into the anchor. Next, the hole is sealed at the collar with a quick setting cement. A plastic grout is then injected into the grout tube until the hole is filled and the grout returns from the end of the hollow bolt. The above procedure is used when there is an upward inclination of the rock bolt. If the bolt is to be tilted downward, a somewhat different procedure is followed (Figure 2-B, Sheet 7 of 8). In this case the hole is not sealed at the collar and grout is pumped down the hollow center of the bolt to introduce grout at the bottom of the drilled hole; thus, preventing the trapping of air at the bottom of the grout hole.

The Perfo rock bolt - The Perfo system consists of perforated steel half-sleeves that are filled with mortar, tied together, and inserted in the drill hole. A steel bar (reinforcing bar, smooth bar, or threaded bar) is then pushed through the sleeve, forcing the mortar through the perforations, completely filling the entire drill hole (Figure 3, Sheet 8 of 8). The Perfo system is satisfactory for long-life rocks that do not provide a normal anchorage for conventional bolts or in jointed or fractured rocks, where anchorage over the entire length of the hole is desirable.

Although a satisfactory anchorage can be developed in most rock types, some care must be exercised in the installation of rock bolts to assure that an optimum anchorage will be made in a relatively thick lamina. A check must be made to insure that the rock bolt is of sufficient length to penetrate stable rock behind the loose block being secured.

Also, if one or more thick lamina can be included within the bolted unit, the strength of the bolted unit may be significantly greater. However, in practice the actual placement of the rock bolt becomes somewhat of an educated guess. For example, if a larger "column" of loose or jointed rock is encountered, it is possible to make the entire rock column stable by bolting the bottom portion of the column; i.e., if the lower "boulder" can be restrained from movement, it will prevent movement of the upper sections and reduce rock falls.

Seam Sealing

Seam Sealing involves the partial removal of relatively thin seams of very soft unsatisfactory material and the resealing of the seams with a durable cap of concrete.

The type material to be removed and sealed will usually be explained in a Special Provision or on the construction plans. The material in the seam to be treated will be removed to a depth at least equal to the thickness of the seam or to a depth which will give firm support to the sealing material.

Removal will be performed with equipment selected by the Contractor provided such equipment produces satisfactory results. The cleaning of the removal area will usually be accomplished with the use of pressurized water and air jets.

Concrete materials used as a sealant will meet the requirements of the specifications and/or special provisions. The method of placing the sealant will be at the contractor's discretion provided such method produces the desired results and leaves an acceptable appearance. In areas where seepage is noted, weep holes should be provided through the sealant.

Asphalt Surfacing

The item of Asphalt Surfacing is for the purpose of covering horizontal sections of rock beams, subject to wear from weathering, with a protective layer of asphalt. Prior to applying the layer of protective

asphalt, the surface of the rock will be cleaned of all loose materials generally with the use of pressurized water or air. Equipment used in the application of asphalt will be at the Contractor's discretion provided such equipment produces a uniform layer at the specified rate with a pleasing appearance.

Pneumatic Concrete Blanket

Pneumatic Concrete Blanket is an intimate mixture of Portland Cement, sand and water, shot into place by means of compressed air. If this mortar is properly proportioned, mixed, placed and cured, it becomes hard and very strong.

The mortar can be applied readily on surfaces of various materials, regardless of their shape or inclination. In Alabama, it has been used for ditch lining, embankment and slope stabilization. It is primarily used in rock cuts where the slopes contain rock materials with a high weathering tendency.

Surfaces to be covered with mortar should be cleaned thoroughly of all loose material and all dirt, grease, oil, scale, and other contaminants.

The Specifications, Special Provisions and Plan Drawings will indicate all necessary details for the placement of the Pneumatic Blanket. These details will include the type anchor bolts to be used, spacing of anchor bolts, type wire mesh reinforcement, clearances of reinforcement, thickness of blanket, etc.

The inspector must make certain that the proper spacing and drill hole size and depth are maintained in accordance with plan details. The drill hole for each anchor bolt must be aligned to be perpendicular to the bearing plate surface. As the bolts are placed, a check must be made to assure that the bolt extends sufficient distance from the face of the slope for attachment of bearing plates and hex nuts.

Before final placement of the anchor bolts, the bolt hole should be cleaned of all drilling dust and other loose material with the use of pressurized water and air. The anchor bolts should then be placed, torqued and the area around the bolts filled with grout. The grout should be allowed to set for a minimum of 48 hours before attaching the wire mesh.

After the anchor bolts are correctly placed and grouted, the entire slope should be cleaned of all dust and loose material created by the drilling operation. The wire mesh should then be attached to the anchor bolts and any required weep holes installed prior to placement of the blanket. It will be necessary to place spacers and "tie-downs" on the wire mesh in order to maintain the proper thickness between the slope and the wire mesh and between the wire mesh and the surface of the Pneumatic Concrete. The weep hole pipe should be filled with paper or some other acceptable material, which can be easily removed after the blanket is placed.

Because of the velocity of the mortar at the time of impact, a considerable portion of the mortar bounces from the surface on which it is being applied. This material is known as "rebound." When applying mortar to vertical or overhanging surfaces or squaring off corners, the rebound averages about 30 percent; for sloping or nearly level surfaces, it is close to 20 percent. The amount of rebound tends to increase with increased nozzle velocity. Within the range of ordinary consistencies, if other factors remain the same, the amount of rebound varies inversely with the water-cement ratio. As the percentage of water is increased, the mortar becomes more plastic and sticky and has greater tendency to adhere to the surface.

One type of machine for pneumatic placement of mortar consists of two compression chambers, one above the other. The sand-cement mixture is introduced into the upper chamber, which is alternately

under pressure and free from pressure. When the upper chamber is closed and the pressure becomes equal to that in the lower chamber, a valve separating the two opens. The material drops into the lower chamber, in which a constant pressure is maintained. In the bottom of the lower chamber a feed wheel, driven by an air motor, takes the material to the outlet where air, introduced through a gooseneck, forces it through the outlet valve and hose to the nozzle. Water under pressure is conducted by a separate hose to the nozzle where it enters the water ring and is sprayed radially into the stream of mixed sand and cement.

Another type of machine feeds the mixture of sand and cement to the material hose by screws. The dry mixture is forced by air through the hose to the nozzle, where water is added as described in the preceding paragraph.

Use of elevators or conveyors and gravity feed greatly increases the output of a pneumatic unit and adds materially to the quality of the product through increased efficiency of the equipment.

Pneumatically applied mortar is ordinarily placed by a crew of three people, a nozzle-person, a machine operator, and a person to clear away the rebound. Only experienced individuals should be employed as the quality of the coating depends in large part on the skill of the people who place it. The nozzle-person places the mortar to line and grade, adds the correct amount of water at the nozzle, applies the mortar systematically so that rebound can be kept cleared away from his/her work, and minimizes rebound by holding the nozzle in the proper position. The machine operator regulates the air and water pressures and the rate of feed of the material in order to produce a flow at the nozzle that is uniform and of the proper velocity. This enables the nozzle-person to place a coating of good quality. The rebound person clears away rebound so that it will not become incorporated in the mortar coating, and also helps the nozzle-person move his/her hose when changing from one position to another.

Operations should be suspended when wind blows the spray from the nozzle and prevents proper control of consistency.

Prior to the use of the special slope protection items covered above and immediately after grading work is completed, the Division should contact the Central Office to schedule an on-site inspection for determining areas to be treated with these items. After this inspection, the Project Engineer should write the Contractor a letter stating estimated quantities for the items needed and request that they be placed as soon as possible to prevent further deterioration of the slope.

Engineering and Inspection.

The following checklists are provided as an aid in checking Engineering and Inspection responsibilities for these four items of slope protection:

Rock Bolting

(1) Are test reports on file to cover materials used in the bolt assembly (Bolt, wedges, expansion anchors, bearing plates)?
(2) Are holes being drilled to the diameter and length specified by specifications, plans and/or manufacturer's recommendations?
(3) Is the length of bolts sufficient to pass through the rock material being anchored and into a thick layer of stable rock material?
(4) Are nuts being torqued to a minimum of 125 ft-lbs. or to the specified torque if the rock materials can not withstand 125 ft-lbs.?
(5) Are holes being drilled perpendicular to the bearing surface?

(6) Are number and lengths of bolts installed being recorded daily in a field book?

Seam Sealing

(1) Is a copy of the appropriate concrete design mix being used on file?
(2) Are appropriate 28-day test cylinders being made to assure adequate concrete strength?
(3) Is concrete being batched in accordance with applicable specification requirements for mix being used?
(4) Is the Contractor controlling the depth of seam removal to that specified? (No depth measurement should be made beyond specified depth.)
(5) Are daily measurements (depth, width and length) of seam removal being made and recorded in a field book by location?
(6) Is removal area clean prior to placing concrete sealant?

Asphalt Surfacing

(1) Are test reports on file to cover the specified grade of asphalt material?
(2) Is surface to receive the asphalt treatment clean?
(3) Is appropriate data (hot volume used, temperature, etc.) being recorded daily in a field book by location for computation of gallons placed at 60º F.?
(4) Have measurements of treated area been recorded in a field book for computation of rate per square yard placed?

Pneumatic Concrete Blanket

(1) Has all loose rock and debris been removed from slope prior to drilling anchor bolt holes?
(2) Is the plan specified or manufacturer recommended spacing, diameter and length of drill holes being maintained?
(3) Are drill holes aligned perpendicular to the bearing surface?
(4) Are anchor bolts and wire mesh of the type specified by plan details and are applicable test reports on file for anchor bolts and wire mesh?
(5) Do the anchor bolts protrude from the face of the slope for sufficient distance to allow attachment of wire mesh, bearing plates and hex nuts?
(6) Is slope being cleaned of all dust after anchor holes are drilled?
(7) Is the grouting procedure of bolts producing the desired results and is grout being allowed to set for 48 hours prior to attachment of wire mesh?
(8) Are hex nuts being torqued to required plan or specification torque
(9) Is the Contractor's approved pneumatic concrete mix on file?
(10) Are concrete test cylinders being made in accordance with ALDOT-231 of the ALDOT Testing Manual?
(11) Are sufficient spacers being installed to maintain specified dimensions between slope surface and wire mesh and between wire mesh and surface of pneumatic concrete?
(12) Are "rebound" particles which accumulate at the toe of the slope being removed?
(13) Have measurements of completed pneumatic concrete been made and recorded in a field book for square yard computations?

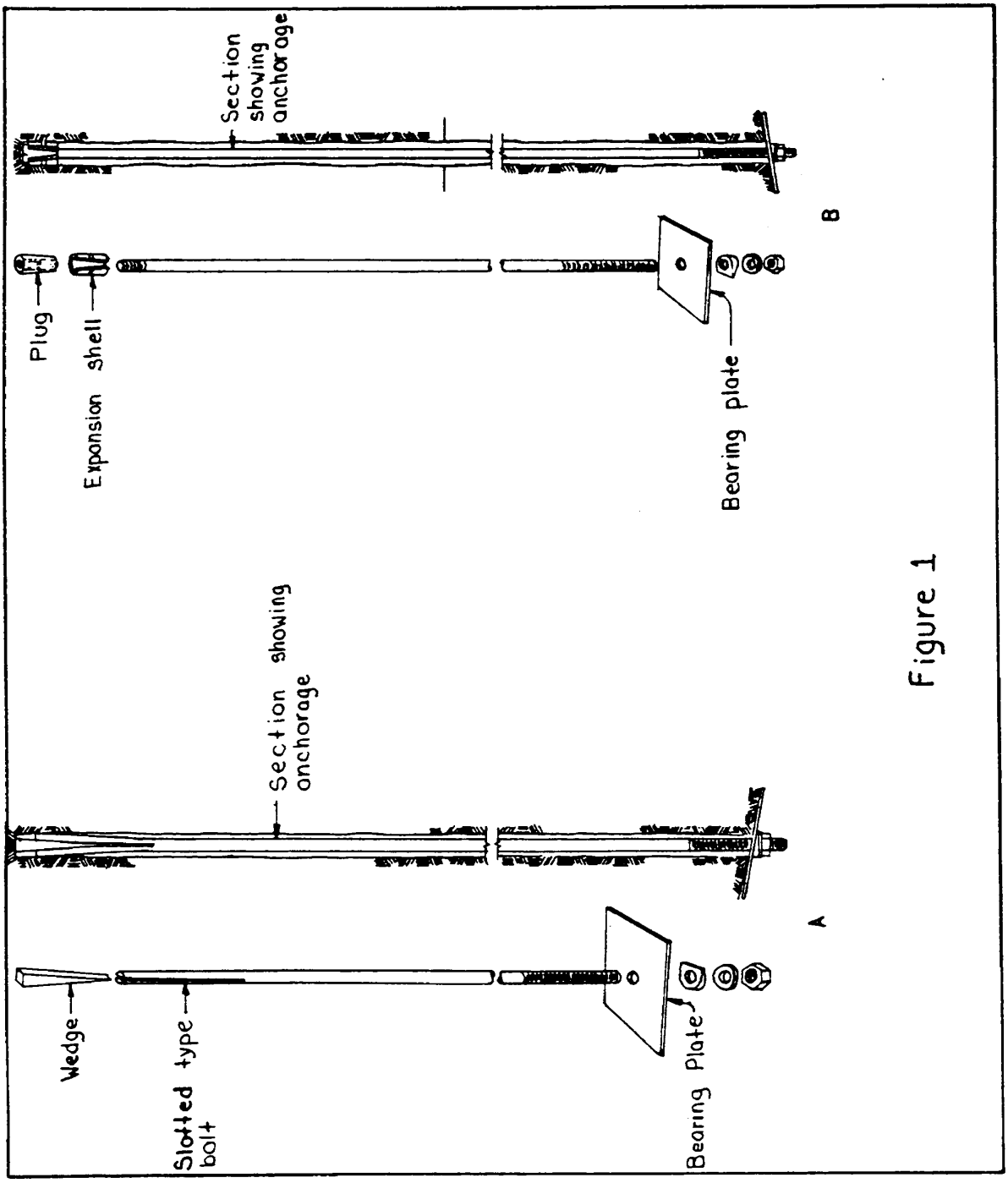

Section showing anchorage
Plug
Expansion shell
Bearing plate
B
Section showing anchorage
Wedge
Slotted type bolt
Bearing Plate
A

Figure 1

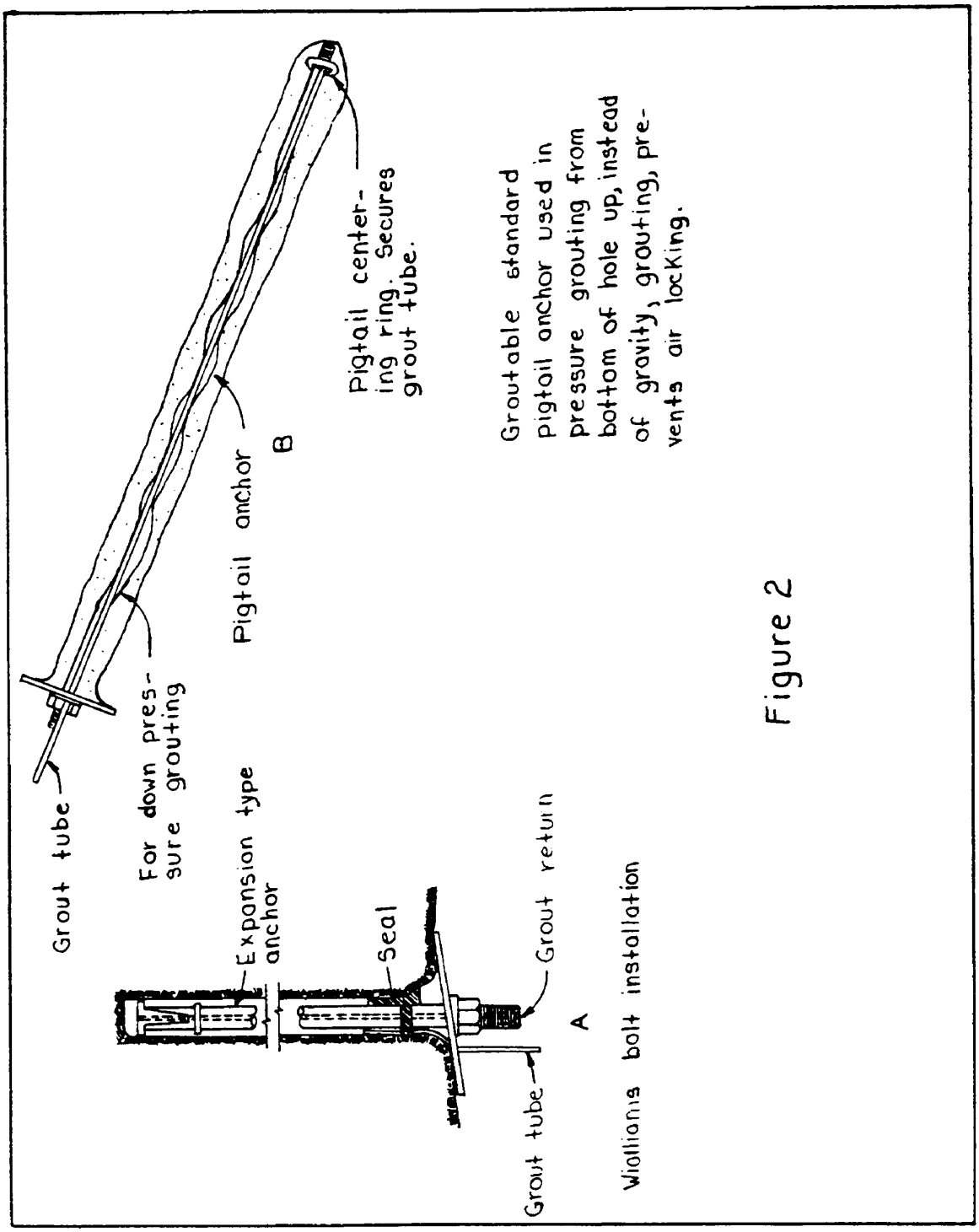

Grout tube
For down pres-
sure grouting
Pigtail anchor
B
Pigtail center-
ing ring. Secures
grout tube.
Groutable standard
pigtail anchor used in
pressure grouting from
bottom of hole up, instead
of gravity, grouting, pre-
vents air locking.
Expansion type
anchor
Seal
Grout return
A
Grout tube
Williams bolt installation

Figure 2

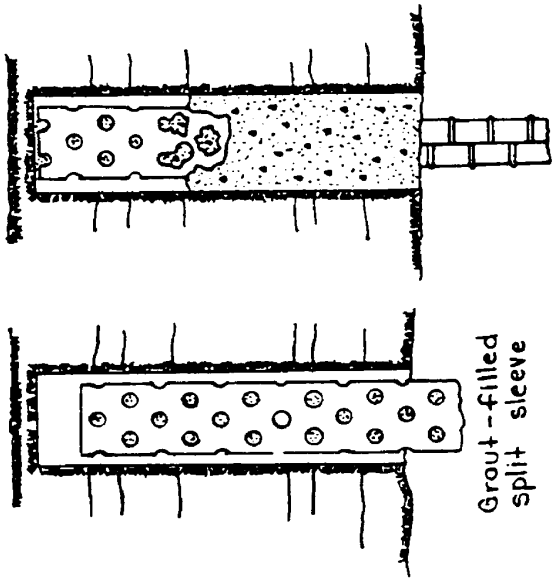


Figure 3

Perfo bolt installation

2:1:D:1.7 Grading and Drainage (Grading, Roadbed, and Roadside Requirements) "Rock Buttress for Slide Correction"

Description of Work.

Rock Buttress for Slide Correction

The purpose of a rock buttress at the foot of an active or potential landslide is two-fold: (1) to provide weight at the toe of a landslide; and (2) to increase the shear strength of the soil by the addition of a material having substantially higher shear strength than the native soil. The typical slump type landslide causes the ground at the toe to move upward, forming a bulge. By adding weight in the form of a toe support where this upheaval would normally occur, the resistance against sliding is increased.

Rock placed in a buttress should be similar to foundation riprap. It should be hard, durable quarry run stone of a size and nature such that it can be placed in layers not exceeding two feet in depth, and any pieces having dimensions to great for placement in a two feet layer should be broken down to a smaller size. In placing the rock backfill, care should be taken to prevent the forming of large voids that are conducive to settlement caused by the migration of finer materials into these voids; and at the same time the buttress should be relatively permeable.

Rock materials generally produce moderate to high resistance to shearing forces even when placed in a relatively loose condition. The rock backfill should be consolidated during placement but no specific density will be required.

Prior to placement of the rock buttress, a trench should be excavated to the plan-specified elevation and section for "Keying" the buttress to the existing soils. Excavation of this trench will be performed with scrapers, front end loaders, backhoes and/or draglines depending upon the location of the trench, type material to be excavated and section of the required excavation.

Any required sub-surface drainage systems will be placed at locations specified in the plan details. Drainage systems may consist of perforated horizontal drains installed by drilling back into the existing slope or standard under drains installed in accordance with Section 606 of the Standard Specifications. The installation of sub-surface drainage systems must be coordinated with the placement of the rock buttress in that some installations will require partial construction of the rock buttress prior to placement.

Equipment used in the placement of the rock buttress will consist of trucks for hauling and generally a front-end loader for placement at the site.

Loose and unsuitable material existing on the slope being repaired or stabilized will generally require removal prior to the backfilling of the rock buttress. Benches may also be detailed on the plans and required prior to backfilling. Material used in backfilling may be borrow, material previously excavated and stockpiled for later use or special backfill material, whichever is specified by plan details. Backfill must be placed in layers as outlined in Section 210 and compacted to specified density.

In the use of a rock buttress for slide correction or prevention, it is imperative that the buttress be constructed to the section and elevation specified and that the backfill and finish slope "tie" to the rock buttress as detailed. These construction details will be indicated in the construction plans and are based on considerable investigation by the Bureau of Materials and Tests. In the interest of economy, construction

of the rock buttress and slope exactly as detailed will in most cases offer only a minimum safety factor. Any field changes to these details will be detrimental to this minor safety factor and may place the slope in a potential failing status. Therefore, any changes to the plan design must be approved by the Central Office prior to implementing.

Engineering.

The Engineer will be responsible for the determination of the limits of excavation for the rock buttress trench, location of slope stakes for finished slope, elevations of the buttress and drainage structures. Once these limits and elevations are determined stakes will be set accordingly. Original cross sections of the slide area must be taken prior to beginning construction. Final cross sections will be required on the excavation for the rock buttress trench, on the existing slope after all loose and unsuitable material is removed and on benched sections.

If borrow is to be used in the backfill of the rock buttress, the Engineer must take original and final cross sections of the pit area.

Any drainage structures to be installed will require an original drainage profile or section and establishment of flow-line elevations by the Engineer.

Underdrain installations may require a profile of the existing ground as opposed to flow-line elevations at the installation location for a determination of extra depth percentages.

Inspection.

(1) Have scales, which are being used in the weighing of stone for the rock buttress and/or special backfill material, been certified in accordance with the specifications?

(2) If from a commercial source, are the loads of stone for rock buttress accompanied by Qualified Weighmaster ticket? If stone is not from a commercial source, is source approved? Do Qualified Weighmaster tickets accompany loads?

(3) Is the rock material to be used in the rock buttress a type specified in the specifications or special provision? Have the Division Materials Section and/or Bureau of Materials and Tests approved this material?

(4) Is the backfill material to be placed behind the rock buttress of the type specified on the plans for borrow or special backfill material? Are test reports on file verifying the classification of these materials? If payment is by the ton for special backfill material from a commercial source, are truckloads accompanied by Qualified Weigh-master ticket?

(5) Are certificates on file for Qualified Weighmasters weighing loads of commercial materials where payment is by the ton?

(6) If payment for Special Backfill is by the cubic yard, have cross sections of the area been taken prior to and after placement?

(7) Are Standard Proctor Densities on file for the special backfill or borrow material?

(8) Is the surface receiving the special backfill or borrow material benched such that the backfill material can be compacted in layers in accordance with Section 210?

(9) Have in-place densities been taken on each layer of special backfill or borrow material?

(10) Does the completed slope tie to the correct line along the top of the rock buttress (back or front)?

2:1:D:1.8 Grading and Drainage (Grading, Roadbed and Roadside Requirements) "Temporary Erosion Control"

Description of Work.

The purpose of temporary erosion control items is to prevent erosion and retain silt within the right-of-way limits of the project until such time as it becomes practicable and feasible to install permanent erosion control items. It is imperative that the Contractor and Engineer realize that the items covered in this unit are, as stated, "temporary" and should never preclude the expeditious installation of permanent erosion control items. Temporary items prevent erosion for short periods of time and the longer a section remains uncompleted and does not have permanent items, such as Flumes and permanent grassing, the more difficult it becomes to contain erosion.

An Erosion Control Plan (ECP) will normally be included within the plans. Temporary erosion control work involves the construction of temporary berms, dikes, sediment basins, drains, fences, dams, etc. with the use of temporary seeding, mulching, erosion control netting, hay bales, sand bags, check dams, riprap, etc. as deemed necessary by the engineer.

When a Department provided Erosion Control Plan is not included in the plans it is the responsibility of the Contractor to provide a detailed plan for the accomplishment of acceptable erosion control on the project prior to the pre-construction conference. He/she should propose methods and locations for both temporary and permanent erosion control measures prior to installation. The Engineer has the responsibility of reviewing and approving these proposed methods before installation and also to determine their effectiveness after they are placed. Thus, a coordinated effort by the Contractor's Field Superintendent and the State's Project Engineer is most important for successful erosion control. This plan is to be used within the project limits as well as for haul roads, material pits, storage sites and other areas to be used for the construction of the project. This plan should be submitted in advance of the pre-construction conference to allow sufficient time for a thorough field review by the Project, District and Division Construction Engineers. This field review should insure that the Contractor has covered all potential trouble areas in his/her plan and has provided for installation at the appropriate time, i.e. prior to Clearing and Grubbing, prior to grading or during the grading operation. A discussion of this field review and the adequacy of the Contractor's submitted plan should be held at the Pre-Construction Conference. The Engineer should then give written approval of the Contractor's plan or request certain revisions and modifications prior to approval.

The Standard Specifications limit the area of exposed erodible material to 17.5 acres for each separate major operation. Any variance from this limited exposed area will require written approval of the Engineer after the Contractor submits adequate justification for such increase. An example of such justification would be for a project with many small cut areas with large embankments, thus requiring the opening of cuts in excess of 17.5 acres in order to complete required embankments. The Contractor should be specific on additional areas requested for exposure and should detail modifications, regarding men and equipment, to his/her original plan. No variations, which would violate the provisions of NPDES permit, should be considered.

In some cases the Contractor may request that he/she be allowed to Clear and Grub an entire project with the understanding that he/she will temporarily seed the project at his/her expense. We might give consideration to clearing the entire project but certainly not to grubbing beyond the specification limit as major erosion control problems begin after grubbing. This proposal may appear good at first thought, but careful consideration can reveal serious erosion problems, which will be detrimental to abutting property. Prior to approval, consideration must be given to the time of year of planting, terrain of the project (flat or hilly), whether soil is highly erodible and adjacent environmental features, such as lakes

and ponds. Generally, this procedure will not be justified for projects which extend over a long period of time and which contain large cuts resulting in other areas on the project remaining exposed for considerable time with no work underway. Even though this temporary seeding will be at the Contractor's expense, the Engineer should assure that the work is performed in accordance with specification requirements and that no provisions of NPDES permit are violated.

The ideal situation for satisfactory erosion control is to clear and grub a cut and fill area (approx. 17.5 acre) and begin grading operations in this area. As grading is continuing in this area, an additional 17.5 acres will be cleared and grubbed. Immediately after cuts and fills are completed in the first area, slopes should be top-soiled and permanent erosion items installed. Many Contractors will want to move from the first area of grading prior to completion in order to prepare other areas for drainage structure installation. However, it is the intent of the specifications that adequate equipment remains in the first area to pursue the section to completion including permanent erosion control items. The Engineer should be alert to this procedure of "spot" grading by the Contractor and advise him/her in writing at an early date of the provision for performance of temporary and permanent erosion control measures at the expense of other operations.

Normally a cut or fill can be completed for placement of permanent seeding without the prior use of temporary seeding. However, on exceptionally large slopes, or just prior to rainy weather in the winter, it may be necessary to temporary grass partially completed slopes. This temporary seeding should be completed in sufficient time to obtain a satisfactory stand of grass before heavy rains and cold weather.

One mistake commonly made in temporary erosion control is trying to stop all sedimentation with a sump or basin immediately at the right-of-way line. When this procedure is followed and a heavy rain occurs, or rain continues over an extended period of time, the sump will fill up and material will begin to leave the right-of-way. It is therefore desirable to place other acceptable temporary items, such as hay bales, polyethylene flumes, riprap dikes, etc. at the beginning of the erosion problem and in advance of the final sump. This procedure offers the advantages of giving more accessible areas to clean out, slowing the water flow to reduce the amount of material removed and providing the final sump at the right-of-way as a safety factor.

Listed below are items now provided in our Specifications for use in temporary erosion control with examples of areas for their use.

Sump Excavation - Used as sediment basin, can be supplemented with pipe, polyethylene, hay bales or other temporary items.

Temporary Seeding - To be used on large cut and fill slopes which could not be completed for permanent grassing prior to winter months. May be used on completed roadbeds, which are to be exposed for a long period of time prior to the Base and Pave contract. May be used on stockpiled materials, which are subject to erosion and siltation of adjacent property.

Temporary Mulching - May be used in conjunction with temporary seeding, if required.

Temporary Pipe - May be used in conjunction with earth dams and sediment basins as a relief valve, preventing the blowout of dam.

Temporary Wire Fence - May be used in conjunction with hay bales as a backup to the bales. Where water is concentrated and velocity is high, the wire fence will be necessary to prevent movement of the hay bales.

Polyethylene - May be used as a temporary lining for ditches. Also may be used as a lining for ditches serving as release outlets for water, which is contained by berms, along the top of a high fill. The purpose of the berms along the top of the fill slope is to prevent water runoff onto the grassed slope until a stand of grass is established. Also may be used as a cover of earth dams to prevent blowout.

Hay Bales - May be used along the toe of fill slopes, as ditch checks, around inlets and at the outlets of drainage structures. Where flow is concentrated temporary wire fence is necessary to prevent movement. Where flow is distributed over a large uniform area, stakes driven through the hay bales are usually sufficient to prevent movement.

Sand Bags - May be used around inlets, at the outlets of drainage structures and as protection of earth dams to prevent blowout.

Erosion Control Check Dams - May be used at the outlets of drainage structures and as dams in ditches and channels where flow is concentrated and of high velocity.

Temporary riprap - May be used for dikes at the outlets of drainage structures and as check dams in ditches and channels. May also be used as lining for earth dams to prevent blowout. If placed appropriately during the initial installation, temporary riprap may be dressed out and left as a continuous erosion control feature.

Silt Fence - May be used in areas where flow is distributed uniformly over a large area. Examples are along the toe of high fills, in ponds and lakes, in low swampy areas. Initial installations should be as close to the beginning of siltation as possible so backup fences can be provided as the initial installation becomes full.

Engineering.

The Engineer will be responsible for making appropriate measurements for computations of all temporary erosion control items installed. These measurements must be recorded in a field book according to date of measurement, date installed, location, and persons responsible for measurement.

For the items of Temporary Seeding and Mulching, preliminary measurements of the area to receive treatment will be necessary in order to determine the pounds of fertilizer, seed and straw to be placed on a given area.

Inspection.

The following checklist is provided as an aid in checking temporary erosion control items:

(1) Has Storm Water Permit been received and on file?

(2) Is an approved copy of the Contractor's erosion control plan on file?

(3) Are temporary items being installed during the appropriate time sequence and as indicated in the approved erosion control plan (prior to clearing and grubbing, during clearing and grubbing or during grading operations)?

(4) If exposed errodible soil exceeds 17.5 acres for each major operation, is adequate justification on file?

(5) Are temporary items being effectively inspected, then maintained by the Contractor at his/her expense though-out the life of the project?

(6) Is the Contractor pursuing the grading of areas to completion, including permanent erosion items, once they are opened to grading? If not, are steps being taken in restricting work on other items until this requirement is met?

(7) Are verifications of materials in the form of identification tags or certifications on file? (Most materials will require only visual inspection) Examples of verifications are as follows:

Temporary seeding - Identification tags on fertilizer and seed Temporary mulching - Visual inspection of type material

Temporary pipe - Physical measurements of pipe and visual inspection

Temporary wire fence - Visual inspection

Polyethylene - Certification or identification tag for thickness; visual inspection

Hay Bales - Physical measurements and visual inspection

Sand Bags - Physical measurements and visual inspection

Erosion Control Check Dams - Visual inspection

Temporary Truck Dumped Riprap - Producer's certification and visual inspection

Silt Fence - Qualified Products List

(8) Have pounds of seed and fertilizer used in temporary seeding been recorded in a field book by dates installed and location?

(9) Has mulch been spread at the specification rate and pounds spread recorded in a field book by date and location? Is asphalt adhesive of the specification type and incorporated at the specified rate? If mulching material is other than a cereal grain straw, is required quantity of annual grasses and legumes in the temporary seed mixes being increased by 50%?

(10) Is polyethylene being installed in accordance with specification requirements for erosion control netting Sections 659 and 860?

(11) Are erosion control check dams being installed in accordance with Plan drawing?

(12) Is silt fence being installed in accordance with Plan drawing?

(13) Are tons of temporary riprap, being shipped from an approved commercial source, documented with qualified Weighmaster tickets ? Is certificate on file for the weighmaster? If not from a commercial source, is source approved? Are weights of riprap documented by Public Weighmaster tickets or **Form BMT-10**?

(14) Are water sampling frequencies and procedures being followed?

2:1:D:1.9 Grading, Roadbed and Roadside Requirements "Permanent Erosion Control"

Description of Work.

It is the intent of the Standard Specifications to require the installation of permanent erosion control items as soon as grading has progressed sufficiently to accommodate their installation. Some of the basic permanent erosion control features are described below:

Ground Preparation and Fertilizers

Prior to performing ground preparation, the Engineer must assure that all slopes and ditches have been completed and dressed to specified lines and elevations. The Contractor may attempt to leave certain areas only rough graded with the hopes of putting the finish "touches" to them during ground preparation. This procedure should not be allowed since equipment used in ground preparation is generally small in size and weight and thus not adequate for moving material from one location to another.

Ground Preparation basically consists of the plowing, scarifying, pulverizing and/or harrowing of areas, providing a smooth, uniform and fine grained soil surface for the sowing of seeds or incorporation of sprigs or solid sod. During the performance of ground preparation, it is intended that the topsoil be lightly incorporated with the existing subsoil for bonding in the prevention of topsoil slippage and sloughing. Slopes should be plowed to a depth of approximately four inches, with the exception of slopes steeper than 2½:l, which should be plowed approximately two inches deep. As roots and/or stones (generally larger than four inches) turn up in the plowing and harrowing operations, they must be removed.

Equipment used in ground preparation will be at the Contractor's discretion provided satisfactory results are obtained. Normally such equipment will consist of farm tractors, plow and disc attachments, and culti-packers or rollers to break up dirt clods. Watering of slopes with the use of water trucks or hydro-seeding tanks may be required during extremely dry periods to facilitate plowing and the breaking of clods. Generally a time period for planting can be selected where adequate moisture will be contained in the soil from pervious rainfall without the need of additional watering. All watering will be at the Contractor's expense.

On slopes steeper than a 2½:l, which can not be traversed by tractors, some modifications and variations to the above listed equipment may be required to accomplish satisfactory scarifying and pulverizing. Some Contractors employ the use of a cable with numerous scarifying spikes attached along its entire length. This cable is mounted to the back of a farm tractor on a swivel and is suspended down the slope. As the farm tractor moves along the top of the slope the cable, generally weighed by a steel ball attached to the end, revolves with the swivel at the other end thus scarifying the slope In lieu of attempting to plow the steeper slopes parallel to the roadbed, an alternate method is plowing up and down the slope with attachments to "track" or "crawler" type equipment such as small dozers.

Slopes that are considered by the Engineer to be too steep or rocky to receive normal ground preparation may receive an alternate type treatment specified (in Subitem 652.03(a)3c of the Standard Specifications.

Where the items of seeding, sprigging and/or solid sodding are provided, payment under these respective items will include ground preparation as described. Only in rare cases will ground preparation be set up as a separate pay item.

Prior to ground preparation and the application of fertilizer, soil samples may be taken by project personnel and submitted to the Auburn University Soil Testing Laboratory for analysis. In order to allow ample time for testing and returning of results prior to commencing seeding and/or sprigging operations, it is recommended that soil samples be taken from the topsoil stockpiles or topsoil pit area in lieu of waiting until the topsoil is spread on the graded slopes. In many cases, the taking of samples after spreading of topsoil will not allow sufficient time for testing prior to lime and fertilizer application and necessary adjustments in these two items can not be made. In general, soil samples are taken to determine any necessary increases to the specified lime and fertilizer rates with usually no decreases made to the specification rate. The only exception would be a possible decrease in the lime rate for high alkaline soils. Sufficient samples should be taken to represent each soil type, which will be spread over a substantial area. If sample boxes are not available through the Bureau of Materials and Tests, they may be obtained from the Local County Agent.

During the ground preparation operation, lime and fertilizer should be spread to the specification rate or rate as adjusted by soil test. These components must be spread in separate operations for proper determination of the spread rate, but can be mixed with the soil concurrently. Rotary tillers and disc harrows will perform mixing. The mixing operation should be sufficient to incorporate the lime and fertilizer to the full depth of ground preparation. This full depth incorporation is necessary for long continued life of the grass after establishment.

The type equipment used in the spreading of lime and fertilizer will depend on the degree and type slopes being treated. Some methods include the use of a truck spreader which utilizes a rotating fan at the back for distribution or a mechanical spreader pulled by a farm tractor which augers material from the bottom through adjustable openings for changes in rate. On extremely steep slopes lime and fertilizer may be spread by hand, but the Contractor should be encouraged to use a mechanical spreader, if at all possible, to secure uniform coverage. Fertilizers may occasionally be applied hydraulically. When applied hydraulically fertilizer must be sufficiently diluted with water so that no damage will occur to seed or sprigs.

Payment under the items of Sprigging and/or Seeding will include the incorporation of lime and fertilizer at the specification rate. If the specification rate of lime or fertilizer is ordered increased or decreased, appropriate payment or deductions will be made at the unit price bid for these individual items.

Seeding

The kind or mixture of seed to be used will be specified in the contract. The pounds of each type seed to be used in the specified seed mix, according to areas of placement and degree of slope, are listed in Subarticle 860.01(b) of the Standard Specifications.

It is the intent of these mixtures to furnish low growing grasses and legumes on the flatter areas that are normally mowed in routine maintenance and to furnish grasses and legumes that require less care and are generally more adaptable on the steeper slopes.

Special seed mixes may be specified for use on steep rocky back slopes or in urban areas. Low growing grasses are generally required in urban areas in order to keep the character of planting of the Department in line with neighborhood plantings for a pleasing appearance. Additionally, special mixes are utilized in urban areas to prevent excessive mowing and eliminate the unwanted species of grasses such as Bahiagrass.

Recently the Department has employed the use of herbicide sprays in controlling the growth of certain species and the elimination of unwanted grasses. In areas where herbicide control is to be used,

the Engineer may substitute the special mix contained in the contract and consistent with the herbicide spray in lieu of the seed mix required by the contract pay item.

Seed will generally be spread on slopes by mechanical means utilizing a hopper type spreader attached to the back of a farm tractor. A rotating fan at the bottom of the hopper distributes the seed to the slope. In lieu of mechanical seeders, the Contractor may utilize several "cyclone" hand seeders with workmen covering various areas of the slope. After sowing, the seed should be covered with earth by the use of metal or timber drags and rolled with a culti-packer to compact the seeded area. After the seed has shown some growth, a second application of fertilizer (nitrate of soda, sulfate of ammonia, ammonium nitrate), which will provide at least 67 pounds of nitrogen per acre should be applied by one of the methods previously discussed.

Depending upon the season of the year in which seeding is accomplished or terrain features requiring special seed treatment, the Engineer may wish to add extra seed of a type more adaptable to the area of planting or season of planting. Extra seed, ordered in writing, will be paid for as outlined in Subarticle 652.05(b) of the Standard Specifications.

The maintenance of seeded areas during the time of establishment of a satisfactory stand of grass will be at the Contractor's expense as outlined in Subarticle 652.03(f).

One important item in the establishment of a stand of grass from seeding is the consistent watering of the seeded areas. However, the watering operation need not begin until adequate moisture from rainfall causes the seeds to sprout.

Another important item for the establishment of a stand of grass of the species sowed is the elimination of weed competition through the proper mowing of seeded areas. The Contractor often neglects this phase of maintenance. When neglected, the Contractor should be advised of the requirements of Subarticle 652.03(f) of the Standard Specifications concerning the frequency of mowing.

Sprigging

The requirements of ground preparation, fertilizing and maintenance of sprigged areas will be the same as for seeding discussed previously and no separate discussion will be made with the comments contained herein for the performance of Sprigging.

The contract will usually specify the type Sprigs to be used in the pay item. If not specified, the Contractor may use any of the types listed in Subarticle 860.02(a) of the Standard Specifications. In either case, the source of sprigs must be approved prior to procurement. The Engineer may wish to request the services of the State Maintenance Engineer for a field review of the source prior to approval. Approval will be dependent on the mowing condition of the field, healthy condition of the sprigs and presence of foreign species.

Equipment, which will be used in the performance of Sprigging, will consist of farm tractors with plow attachments, disc harrows, culti-packers, mechanical spriggers and/or plugging machines. In lieu of the advance plowing of furrows and the hand placing of sprigs, the Contractor may wish to use mechanical spriggers or plugging machines of an approved type.

The mechanical sprigger basically consists of a machine attachment to the rear of a farm tractor which is capable of plowing a furrow, placing the sprig, covering and compacting.

The plugging machine will be a self-propelled unit capable of plowing a furrow, cutting solid sod into small plugs (approximately two inch x two inch), placing the plug into the furrow, covering and compacting the plug.

It should be noted that the mechanical spriggers and plugging machines must be of an approved type. Generally this approval will be based on the satisfactory field performance of the unit as the responsibility of providing a satisfactory stand of grass rests upon the Contractor.

In some cases the Contractor may request permission to "broadcast" sprigs as described in Subitem 653.03(a)3b. Written permission must be obtained from the Construction Bureau prior to allowing this method of Sprigging.

The moisture content of the soil during the performance of Sprigging is very important to its satisfactory accomplishment. Sufficient moisture must be available to provide a stable embedment of the sprig.

Watering after the planting of sprigs is also an item which is mandatory in achieving a satisfactory stand of grass. Contrary to the item of seeding, where watering can be delayed until the seed sprouts, the watering of sprigged areas must generally begin immediately after planting. Since no direct payment is provided for watering, the Contractor will attempt to delay watering as long as possible. A stand of grass is often not accomplished due to the neglect of the single item of watering. If the Contractor continuously allows sprigged areas to become dry and crusted, the Engineer should so advise him/her in writing, as possible later documentation as to reasons for the loss of a stand of grass.

During extreme weather periods, which are not conducive to Sprigging, the Engineer may authorize the substitution of Seeding in the interest of early erosion control. This substitution must be made within the guidelines of Subarticle 653.03(d) of the Standard Specifications. Also in the interest of early erosion control and the protection of previously sprigged areas, the Engineer may authorize "Over-seeding" as outlined in this same Subarticle.

Solid Sodding

Even though the item of solid sodding is considerably more expensive than other grassing items, there are many instances where its use is desirable and justified. Some areas of use include ditches with highly erodable soil and grades too steep for seeding or sprigging, steep sandy slopes in urban areas or areas adjacent to streams or lakes where immediate ground cover is required to prevent siltation, in urban areas for conformance to existing lawns, in interchange areas and in Rest Area and Welcome Center projects. Solid Sodding placed in lawns in urban areas is also a good public relations measure in that it quickly eliminates the tracking of mud from the construction area and restores the area to its previous condition as expeditiously as possible.

The type sod to be used on a particular project will usually be specified along with the pay item provided in the contract. The type of sod specified will depend upon the area of use (steep slope, urban area, rest area or welcome center) and upon the native grass within the area. If no particular type is specified, the Contractor may furnish any of the types specified in Subarticle 860.05(a) of the Standard Specifications. In either case, the source must be approved by the Engineer prior to procurement. The Project Engineer may wish to request assistance from the Central Office (State Maintenance Engineer) in reviewing the sod source prior to approval. Considerations in approval will consist of the mowing condition of the field, whether or not the sod is well established and whether or not the field contains foreign species which would be detrimental to obtaining a satisfactory stand of the approved sod.

After the sod has been cut, it will usually be hauled to the job site on a trailer truck with sod stacked on wooden pallets. The furnished depth of each individual piece of sod is checked by measuring the total depth of sod stacked on a pallet and dividing this total depth by the number of rows of sod to give an average depth for each row. If not of the specified thickness, the entire pallet of sod should be rejected. In lieu of cutting sod in blocks (approximately 12" x 18"), it is now becoming a common practice to furnish solid sod in rolls. The length of the rolls will vary, but are usually six to eight feet. Sod is generally cut in 12-inch widths due to our specified 12-inch strip to be placed along concrete flumes. The Contractor may wish to furnish wider widths of sod, but no payment is to be made beyond the width specified by the plans and specifications.

Prior to placing solid sod the earth should receive ground preparation and fertilization as previously described unless otherwise directed by the Engineer.

Items which may sometimes be neglected by the Contractor and thus require close observation by the inspector include placement of the sod in a closely knit manner, tamping of sod after placement to eliminate ridges and consolidate joints, and the proper watering of sodded areas. Watering should begin immediately after sod placement in the absence of adequate rainfall. Since no direct pay item is provided for watering, the Contractor can only be encouraged to provide this requirement and not forced. Encouragement should include letters, which bring to the attention of the Contractor excessively dry areas and requiring replacement when a satisfactory sod turf is not obtained.

Mulching

The purposes of the application of mulch in conjunction with seeding and sprigging operations are to aid in the retention of moisture, to shade the planted area from direct sunlight and to retain seed in place after sowing. Certain sprigged areas which contain adequate shade and are located on relatively flat slopes may not require mulching in order to establish a satisfactory stand of grass.

Mulch to be used will be designated as to Class and Type. Class "A" mulch will be used in conjunction with seeding and sprigging and Class "B" mulch will be used in conjunction with the planting of vines, trees and shrubs. Various types of each class of mulch are listed in Article 860.03 of the Standard Specifications. If no particular type mulch is specified by the contract, the Contractor may select any of the type mulches listed in the Standard Specifications. Provided however, the type to be furnished will not be detrimental to the planted species or to adjacent farmland and lawns. Whether specified or not, the source should be inspected and approved by the Engineer prior to procurement and use.

Straw and hay mulch are to be applied with a mechanical spreader capable of spreading the mulch at the specified rate and at the same time incorporating an asphalt adhesive, on slopes steeper than 3:1, onto the straw or hay for greater stability after placement. Normally a blower type spreader is used with the asphalt incorporated by a nozzle attachment at the end of the blower chute. On slopes 3:1 or flatter, a krimping operation will be used instead of using an asphalt adhesive. Wood fiber mulch is spread hydraulically, generally with the use of a hydro-seeder. Excelsior mulch is to be applied with a mechanical spreader or other approved equipment. Asphalt adhesive is not required with either wood fiber or excelsior.

The most commonly used Class "A" mulches are straw and hay for typical roadway projects. However, for Rest Areas, Welcome Centers and similar projects, which contain features that can easily be damaged by the asphalt adhesive, the excelsior or wood fibers are satisfactory alternatives.

The rates of application for each type of mulch should be as specified in Article 860.03 of the Standard Specifications with proportionate increases when the moisture content exceeds that specified at the time of placement.

Hydro-Seeding and Mulching

Prior to hydro seeding an area, ground preparation and fertilization will be as previously described for the items of seeding and sprigging.

Hydro Seeding is a process by which a water-seed-inoculate mixture is sprayed hydraulically onto a roadway slope through the use of equipment designed solely for this purpose. Equipment used consists of a "hydro-seeder" containing a tank with agitators, water pump and a dispersing nozzle directed by an operator.

A project will usually be hydro-seeded in one to two acre increments. The area to be treated will be pre-measured and sufficient seeds of the required species prepared with inoculant, mixed and incorporated into the hydro-seeder prior to spraying. The mixture must be agitated continuously during the entire operation to prevent the separation of the seeds and to insure a uniform rate of seed application.

Water used during hydro seeding will cause the seed to germinate. Therefore, constant watering after seed application will be required to prevent the seed sprouts from dying out.

Mulch is to be applied in a separate operation from the seeding. Wood fiber mulch will be applied through the hydro-seeder used in the seeding operation. Other type mulches will be applied by equipment previously described under Mulching. Even though mulching is applied in a separate operation, only one payment is made for the area treated under the item of Hydro-Seeding and Mulching.

The type seed mix and mulch to be used in Hydro-Seeding and Mulching will be specified in the contract pay item.

Erosion Control Netting

Erosion control netting is divided into two classes. Class "A" is an open type netting and is used to stabilize solid sod or mulching. Class "B" contains a "filler or blanket," in addition to a retaining net, and is used to stabilize seeded or sprigged areas until a satisfactory stand of grass can be established. Mulching is deleted in areas where Class "B" erosion control netting is utilized.

The most common use of Class "A" netting is to stabilize solid sod placed on slopes 2:1 or steeper and to retain solid sod placed in ditches until the root system becomes established. Class "B" netting is most commonly used in ditches to retain seeding and sprigging until a satisfactory stand of grass is obtained.

It is imperative that erosion control netting be installed exactly as outlined in Article 659.03 of the Standard Specifications and plan details regarding the burying of edges, and frequency and number of staples. Any deviation may lead to an undermining of the netting and thus failure of its intended purpose.

Vines Shrubs and Tree Planting

The construction plans will usually indicate the general location of each type species to be planted. After specific locations are staked, the Engineer may wish to request assistance from the Central Office (State Maintenance Engineer) for a review and any recommendations for deletions, additions or relocations of plantings. The Bureau of Construction must approve any additions prior to ordering.

Sections 660, 661 and Article 860.06 of the Standard Specifications cover in detail the subjects of digging and transporting of plants, shrubs and vines, planting details, planting seasons and limitations, maintenance and replacement and no further comment is felt necessary here.

Engineering

Before the Contractor begins work on the items of Ground Preparation, Seeding, Sprigging, Solid Sodding, Hydro-Seeding and Mulching, the Engineer will be responsible for measuring the areas to receive these permanent erosion control items. These measurements are taken by flat chaining along the surface to be treated at right angles to the roadway. These measurements are taken at a minimum of each 50-foot station and recorded in a field book by each station. The measurements are turned over to the inspector for his/her use in computing the quantities of fertilizer, lime) seed, sprigs, and/or mulch to be applied to any area treated. Also these measurements will be used in computing the acreage or square yardage for which payment will be made under the appropriate pay item.

In the planting of trees, shrubs and vines, the Engineer will be responsible for the advance staking of all species to be planted. Long painted stakes with the name of the tree or shrub to be planted written thereon are generally used.

Inspection

The following checklists are provided for the various permanent erosion control items to assist the Inspector in his/her duties:

Ground Preparation and Fertilizers

(1) Is the scarifying, pulverizing and harrowing being accomplished to the specified depth? (Subarticle 651.03(b).

(2) Is the Contractor removing all roots, rocks and other materials which are sufficient in size to be detrimental to the growth of grass and which will present later problems in mowing or other landscape maintenance?

(3) If ground preparation is being performed in accordance with Subitem 652.03(a)3c, in lieu of the standard ground preparation outlined in Section 651, is written permission from the Central Office on file?

(4) What is the required specification or soil analysis rate of lime and fertilizer for the area being treated? Is the poundage of lime and fertilizer being applied to a given area properly documented? The inspector will determine the pounds of lime and fertilizer to be placed on a given area using the recorded measurements previously taken by the survey party and the required specification or soil analysis rate. As the fertilizer and lime is applied, the pounds spread must be recorded in a field book either from a count of the number of sacks used or from weight tickets if hauled in bulk form. Each day the inspector should record the weights of lime and fertilizer used, the location where used, and the acreage covered. Tags should be retained from the fertilizer sacks as documentation of the percentage of components used

and the pounds of fertilizer spread. The tags will also serve as adequate test reports. Proportionate increases or decreases must be made if the Contractor desires to use a fertilizer with percentage components different than specified. For Example: When we specify 1500 pounds of 8-8-8 fertilizer, the Contractor can use any standard approved commercial grade fertilizer that will provide 120 lbs./acre of each of the components of nitrogen, phosphorus and potash (8% of 1500 = 120).

(5) Is limestone or basic slag pre-tested? If not pre-tested, are samples being taken in accordance with frequency of ALDOT Testing Manual? Are adequate test reports on file?

Seeding

(1) Does each bag of seed contain tags certifying its contents, tests and analysis?

(2) Is the poundage of each type seed being used properly documented? Each day the inspector should record the pounds of each type seed used, location where seeds are placed and acreage covered by seed.

(3) Are proportionate increases being made to the poundage of the type seeds found to be deficient in required minimum germination and purity percentages?

(4) Are the seeds of legumes designated by Article 860.01 for inoculation being inoculated and sowed as outlined in Article 860.07 and Subarticle 652.03(b)

Sprigging

(1) Is a letter on file documenting the approval of source?

(2) Has the source field been mowed to a height of three inches maximum prior to harvesting?

(3) Does the harvesting method leave at least two inches of the root system intact?

(4) If plugs of sod are used as sprigs, is the size at least two inch x two inch?

(5) Are sprigs being loaded within one hour after digging and immediately transported to area of planting? Is a satisfactory method being used to keep the sprigs cool, moist and shaded until planted, including transportation time?

(6) Are sprigs which are three days old or which have dried out being rejected? It is advantageous that the sprigs be planted in the same day as dug. In either case they must be kept moist and viable until planted. This can be accomplished by sprinkling and covering with wet burlap.

(7) Is the required depth of cover being obtained by the sprigging or plugging machine? (one-half to one inch for centipede, Hybrid Bermuda and Zoysia species and one to two inches for Common Bermuda).

(8) If over-seeding is allowed for the protection of sprigged areas, is written authorization on file for such over-seeding?

The above checklist is written around specification requirements, which serve as a guide for the Contractor, as well as the inspector, in obtaining a satisfactory stand of grass. The Contractor may wish to slightly deviate from these requirements based on his/her past experience with certain species of grasses. In allowing these changes the inspector should use good engineering judgment and must not lose sight of the fact that the Contractor is responsible for a satisfactory stand of grass prior to final acceptance or release of a grassing bond furnished by the Contractor.

Solid Sodding

(1) Is written approval of the source on file prior to cutting?

(2) Has source been mowed to a height of at least two inches prior to cutting?

(3) Is the thickness of the sod as required? (A check of the thickness should be made at least once daily and recorded. Additional checks should be made of random pallets and/or rolls throughout the day by the inspector to insure himself/herself that the sod is continuously meeting specification requirements.)

(4) Is the sod being tamped and installed in a closely knit pattern?

Mulching

(1) Is the mulch material being used of the type specified by the contract item? If not specified, is the mulching material of a type specified in Article 860.03?

(2) From a visual inspection, does the mulching material meet the physical requirements of Article 860.03?

(3) Is the poundage of mulch material being applied properly documented? Each day the Inspector should record the pounds of mulch used, the location where placed and the acreage covered.

(4) If excessive moisture is noted by the Engineer in the mulching material, are moisture samples being taken and proportionate increases being made in the application rates specified in Article 860.03?

(5) Are sufficient test reports on file for the asphalt adhesive used with hay or straw mulch?

(6) Are the gallons of asphalt adhesive used being properly documented as to gallons used, location where placed and acreage covered?

Hydro-Seeding and Mulching

(1) Is the hydro-seeder being used capable of continuously agitating the water-seed-inoculate mixture during spraying?

(2) Is the poundage of each type seed used being recorded as the hydro-charged? With each tank mixture, the inspector should record the seed used, the location where placed and the acreage covered.

(3) Is four times the manufacturer's recommended amount of inoculant being used for species to be inoculated?

Erosion Control Netting

(1) Are certifications and test reports on file for the types of erosion control netting being installed (include staples)?

(2) Do the materials meet the physical requirements of Article 860.11?

(3) Is the netting material being buried on the edges and stapled as outlined in Article 659.03?

Vines Shrubs and Trees

(1) If the vines, shrubs and/or trees are not tagged or sealed by the Department, has an inspection been requested through the State Maintenance Engineer's office prior to planting?

(2) Does the guying, bracing and wrapping materials perform satisfactorily and meet physical requirements?

(3) Is a record being made each day of the type, number, and location of trees, shrubs and vines planted?

(4) Are the loads of plant topsoil used being properly documented with tickets **C-7-C** and **C-22-C**?

2:1:E Drainage Requirements

2:1:E:1.1 Structure Excavation, Laying and Backfill of Drainage Structures

Description of Work.

This unit covers details for the excavation, installation and backfilling of drainage structures below the classification of a bridge structure.

The type, size, location and strength requirements will be determined during the design stage and shown on the construction plans. Only reinforced concrete pipe will be used for roadway installations. For side drain installations the pH value, denoting whether the water is of high alkaline or acid content, will require that the side drain structure be of a specified material. For example, concrete pipe will usually be specified where the pH value is low denoting a high acid content. If no particular pH problems are present, the Contractor will be permitted to use any of the optional types of pipe permitted by criteria outlined in Article 535.02. The Contractor is responsible for selecting the proper gauge of metal or class of concrete pipe to be used in conjunction with applicable plan special drawings for the required fill height from top of pipe to top of base course. The Engineer should verify from the Special Drawing tables that the proper Class or Gauge has been furnished.

Often times, a preliminary site inspection will indicate that a drainage structure will function better if moved somewhat from the plan location or the skew slightly changed. The Project Engineer should take this initiative prior to the staking of the drainage structure and insure that all individuals involved are made aware of any changes.

All Pipe Structures, 48 inches or less in diameter, must be laid in a trench extending 12 inches above the elevation of the top of the pipe. The quantity of structure excavation will be measured from the subgrade elevation in cut sections or from an elevation one foot above the top of the drainage structure in fill sections. Therefore, for drainage structures in fill sections, it will be necessary for the Contractor to construct the fill in the area of the drainage structure to the elevation of one foot above the top of the pipe prior to excavating the pipe trench. This fill should extend a minimum distance of ten feet from each outside edge of the pipe and must be constructed and compacted in layers in the same manner as other roadway embankments. The reason for prior construction of this fill is to provide side support as the backfill material is compacted around the pipe. This advance fill construction will not be required for box culverts or for pipe with diameters in excess of 48 inches. Excavation for drainage structures in excess of 48 inches will be measured from subgrade elevation or natural ground.

Equipment used on the excavation will be at the Contractor's discretion provided the excavation is performed in such manner that the side support, provided by the trench during backfilling is not lost. This support will be lost if the trench is excavated too wide or with extensive sloping sides. Backhoes, gradalls and draglines are usually employed in Structure Excavation. The use of scrapers and dozers will be unacceptable except for the larger sizes of pipe.

As the flow-line elevation is reached in the trench excavation, unsatisfactory material may be encountered which will not provide the required specification or plan bedding. This unsatisfactory material may consist of rock or the reverse situation of wet undesirable soil. In either case, this unsatisfactory material must be excavated to the required specification depth (rock) or depth as directed by the Engineer (wet soils) and backfilled with material designated as Foundation Backfill. The Foundation Backfill may be taken from select areas within the grading limits of the Project or from sources outside the Project

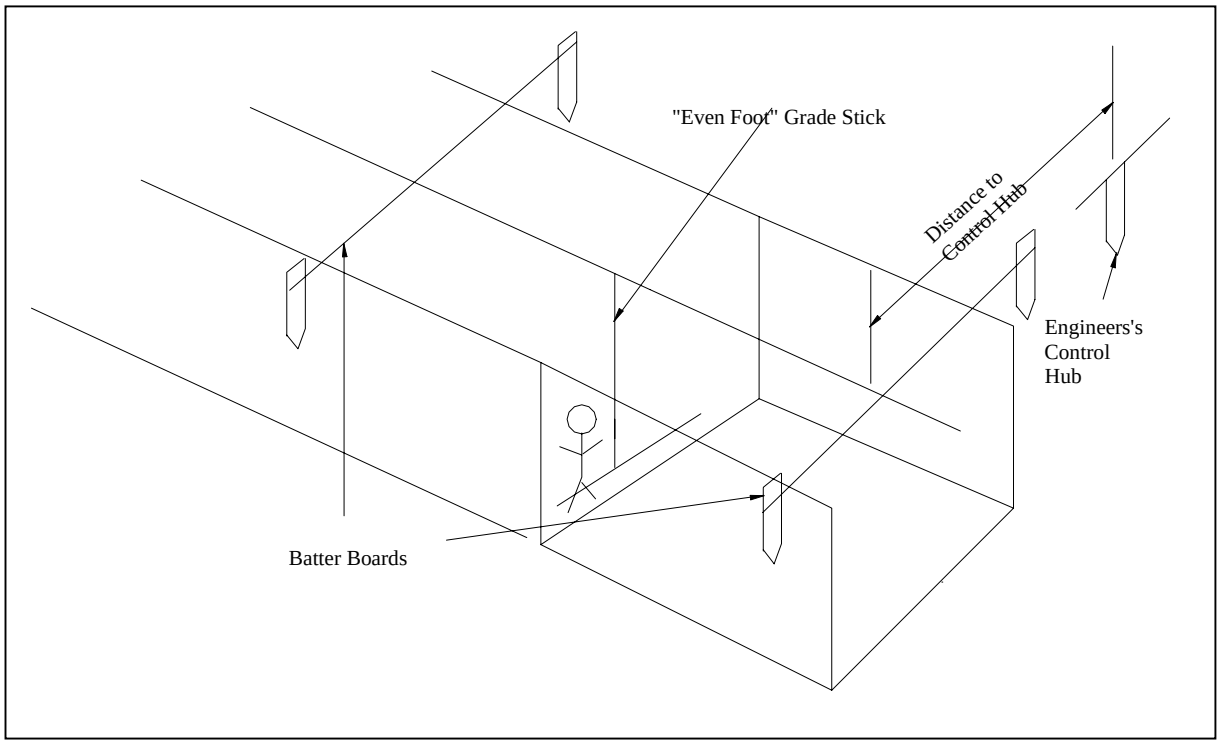
limits and respectively designated as either local or Commercial Foundation Backfill. Payment for Foundation Backfill will be computed at 150% of the excavated volume that it replaces.

During the excavation operation and the installation of the drainage structure to follow, the Contractor will be responsible for the temporary handling of surface water. For smaller drainage structures, the laying operation can generally take place during a time when surface water will not be present. For the larger structures, usually installed at stream crossings, water will be continuously present and a temporary "run-around" channel, temporary pipe or other satisfactory means of handling the water will be required.

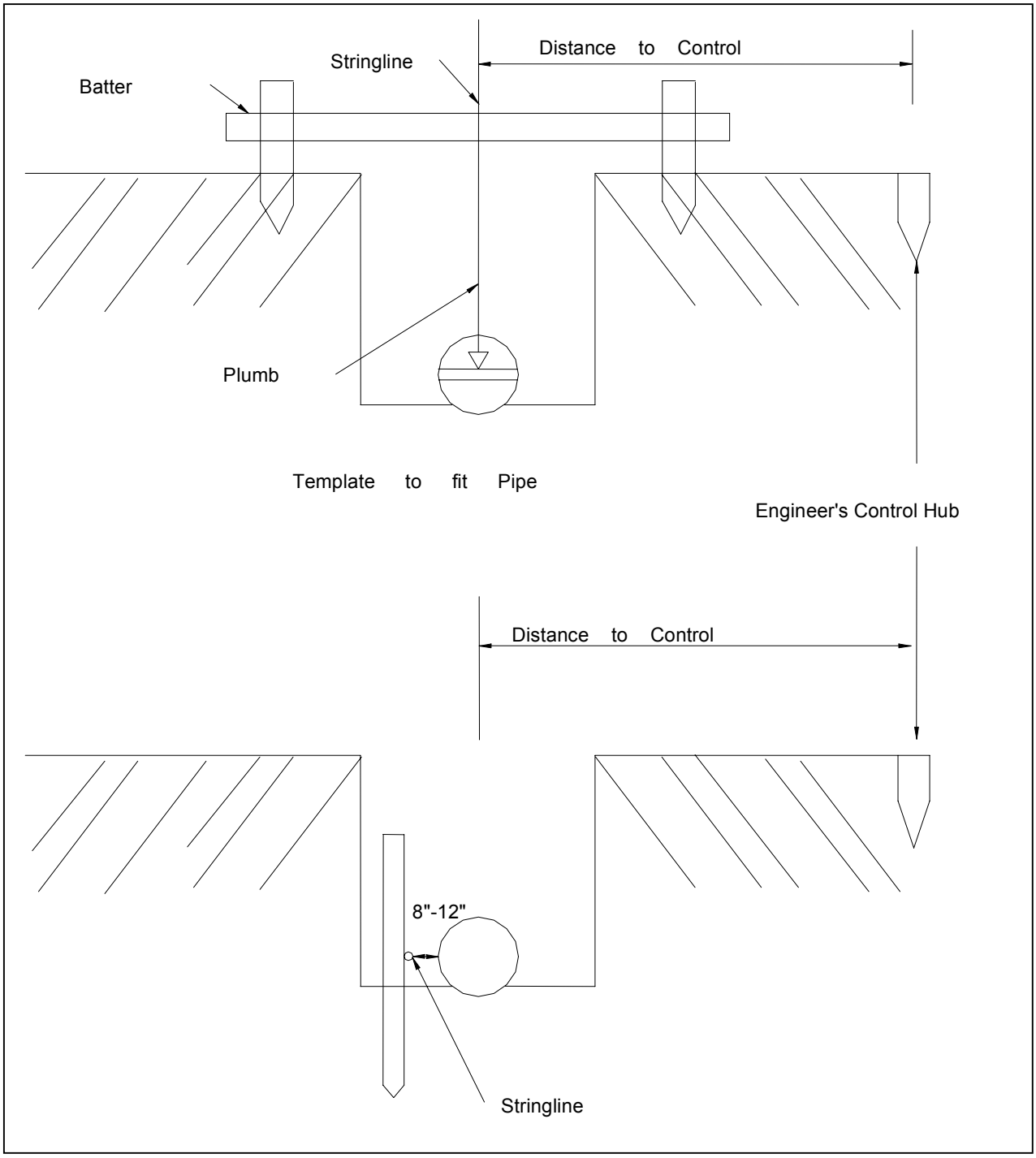
When Engineering Controls are included within the proposal, there are several methods which are utilized by contractors to maintain alignment and elevation grade control for excavation and structure placement. The method chosen by the contractor should be discussed with the Engineer prior to excavation and placement operations. This will insure that both the Contractor and Engineer know what method is being used to avoid any misunderstanding. Such methods include the use of transits, theodolites, levels, laser levels, string lines, etc.

One method the Contractor may utilize for alignment and grade control is, as the trench approaches the flow-line elevation, batter boards are installed using the elevation hubs previously established by the survey party. These batter boards are set at an "even-foot" elevation above the flow-line or bottom of pipe elevation. A string line is pulled along the tops of the batter boards. A stick, cut to the "even-foot" length from the string-line to the desired elevation, say six feet, is used for quick and frequent checks of elevations during the fine grading of the trench. The following sketch details this procedure:

"Even-Foot" Grade Stick"



During the laying of the drainage structure for alignment control, the Contractor may utilize the string line previously installed along the centerline of the trench for fine grading of the trench bottom or may install a separate string line along the side of the drainage structure. These two methods of alignment control are illustrated in the following sketches:



Preceding the laying of the drainage structure, the bottom of the trench will be shaped to conform to a percentage of the pipe section as required by plan special drawings for the specified class bedding. If the bell ends of the pipe joints protrude beyond the outside diameter of the pipe, the bottom of the trench must be notched out at each bell end in order to accommodate the protrusion and allow full bearing of the pipe joint for its entire length.

Various types of equipment will be used for the lowering of pipe joints into the trench but must be such that no damage will occur to the structure. Metal pipe is generally furnished in 20-foot joints with metal pickup attachments provided at approximately the 1/3 points. A chain with hook will be attached to the pickup points and to the equipment for lifting. For the larger sizes of metal pipe (exceeding 36 inches), a spreader bar may be necessary to prevent undue deflection during lifting.

Concrete pipe joints are now furnished in varying lengths, primarily four foot and eight foot joints. A "Pipe Hook" (a U-shaped hook of heavy steel angles) is generally used in the lifting and lowering of concrete joints into the trench. The "Pipe Hook" is inserted onto the top circumferential wall at the bell end for lifting and lowering into the trench. The top of the spigot end is inserted into the bell of the previously laid joint and the pipe slowly lowered as pressure from the pipe layers is applied to the bottom of the bell end thus forcing the spigot end into place for its entire circumference. The hook is then lowered and removed from the installed pipe joint. For larger sizes of concrete pipe, attachment holes are sometimes pre-cast into the pipe wall to accommodate pickup equipment. Heavy-duty elastic belts are sometimes used in the lifting and lowering of concrete pipe. Steel chains should only be used if the method of lifting is such that the chains do not cause spallation of the concrete by the action of the chain coming into direct contact with the concrete.

In the laying of concrete and metal pipe, laying operations will begin at the outlet end and progress upgrade, thus the bell end of concrete pipe will be on the upgrade end. Metal pipe with a paved invert must be laid in such manner that the paved invert is exactly in the bottom of the pipe. In the storage of metal pipe, it is also imperative that the paved invert be at the bottom of the pipe.

As the concrete or metal pipes are joined together, a sealed joint must be obtained. For concrete pipe Rubber Gaskets, Bituminous Plastic Cement (Mastic) or concrete mortar is generally used in the sealing of the joint. The spigot end of the joint being laid must be inserted into the bell end until only a minimum opening (not more than 1/2" for 1/3 of the circumference will be considered acceptable) exists between the pipe edges. In the sealing of concrete joints, it is intended that sufficient mastic or mortar be placed in the lower half of the bell end of the previously laid joint to cause a squeezing of this mastic or mortar from the joint as the spigot is inserted. The lower half of the inside must then be wiped smooth. The upper half of the joint is then sealed by forming a bead of mastic or grout around the outside of the pipe. Concrete grout, which is exposed to the sunlight, must be moist-cured by one of the methods specified in Section 501 or by wetted earth.

Joints of metal pipe will be connected with the use of connecting bands as specified in Subarticle 850.02(d) (AASHTO M 218 or M 274). Metal pipe with helical corrugations will be banded together with connecting bands containing projections. Metal pipe with circumferential corrugations may be banded together with the use of connecting bands with projections or connecting bands with circumferential corrugations. In general the connecting bands will not properly seal the joints of metal pipe, especially the larger sizes (24" plus). In all cases, each joint must be inspected and if noted that a proper seal is not provided by the band, additional sealing materials meeting the requirements of Section 846 must be provided (usually a bituminous cement or mastic will be used).

The critical operation to insure maximum strength and service from pipe culverts is the compacting of the backfill around the pipe. This is true for all types of pipe and all types need adequate side support to

develop full strength. Poor compaction and hence poor side support may result in the cracking of concrete pipe and deflection downward and outward for metal pipe. Cracking may result in failure. Deflection is accompanied by settlement of the backfill up through the embankment resulting in a dip in the pavement. Backfilling should be permitted only in the presence of the Inspector. He/she should permit the use of only the best of excavated trench material around and for a foot over the pipe. If the best is of doubtful quality, special material should be hauled in and paid for under the classification of material used. The backfill must be compacted in layers not more than six inches thick compacted, at just below optimum moisture content, adding water when and as needed to secure proper compaction. Each layer must be compacted to at least 95 percent of T-99 Density. Tests should be run to insure proper density. Mechanical tampers are preferred for this work.

Subsequent layers above the pipe must be compacted as in ordinary embankment. If the Contractor incurs trouble with pipe lifting out of position while being tamped under the haunches, it is his/her responsibility to use satisfactory means of preventing this occurrence. At least two feet of material should be in place above the top of the pipe, prior to crossing with heavy equipment.

For pipe over 48 inches in diameter and extending above the top of the trench, embankment material must be placed and compacted along each side of the structure for a width equal to at least twice the inside diameter of the pipe, or 12 feet, whichever is less. The embankment should be brought up concurrently on each side of the pipe to avoid displacement or damage from unequal side loads.

Storm Sewers

The above details have been primarily directed to the installation of roadway cross-drain structures. The installation of storm sewers (drainage structures outside the roadway paving) is basically the same but a few differences will be pointed out here. It should be remembered that storm sewer pipe generally will not be required to withstand as heavy loads as roadway pipe. However, compaction and density requirements are the same as roadway pipe. Cleanup requirements are usually more strict for storm sewer pipe in that most installations occur in urban and/or easement areas. In some cases, excavated material may have to be removed from the installation site as it is excavated and a portion returned for backfilling after the storm sewer has been laid. (Occurs frequently in urban areas where storm sewer is being laid back of the curb and gutter along the lawns of residences). It must be noted that where a storm sewer passes under a roadway (Cross street or main roadway) the Department's policy of using Concrete Pipe should be followed. For pipe under driveways (where number of driveways are extensive or heavy loads anticipated), strength requirements must conform to roadway pipe in lieu of storm sewer.

Box Culverts

In the construction of reinforced concrete box culverts, a consolidated, firm foundation is imperative prior to the pouring of the floor slab. Isolated soft areas must be eliminated to prevent differential settlement resulting in the cracking of the floor, walls and/or top slab of the culvert. During the excavation, the inspector must be alert to require the removal of any unsatisfactory material and replacement with foundation backfill material. Water from sub-surface seepage will generally be present during the excavation, even though the surface water has been re-routed. Therefore, it is imperative that the foundation backfill material be a free-draining material suitable for placement under water.

After a satisfactory foundation has been established, box culvert construction will begin with the laying of the floor reinforcing steel and installation of all side wall reinforcing steel that ties into the floor slab. To hold the side wall reinforcing steel erect, the outside side wall form will be placed during this phase. The floor slab will then be poured with a riser wall (approx. six inches) provided on the side wall. This side wall riser establishes the desired wall thickness, provides a base for the abutting of the inside

side wall form when placed, and provides an appropriate bond feature for the side walls to the floor slab. Box culverts, eight feet or less in height, may be poured as a monolith (side walls and top slab at the same time). Box culverts over eight feet in height will require the separate pouring of side walls and top slab. It is felt that this separate pouring of side walls and top slab for larger pours reduces the shrinkage cracks, which might develop in the walls.

Construction joint spacing will be as outlined in Section 524 of the Standard Specifications and as detailed on Plan Special Drawings. Certain traffic handling schemes may necessitate modifications to the distance between construction joints to safely handle traffic through and around the work as the culvert crosses a travel-way.

Plan Special Drawings will detail changes in the size and spacing of reinforcing steel and changes in the thickness of walls, top slab and floor slab for various fill heights. Plan Special Drawings will also detail the general break points for applying these different design requirements throughout the length of the culvert. The location and spacing of weep holes will be as detailed on Plan Special Drawings.

Forms, which are non-supporting, such as outside wall forms, should be removed as soon as the concrete has taken set to facilitate the application of the Class "1", ordinary surface finish. Supporting forms, such as the top slab form, must not be removed until the strength or time limitations of Item 501.03(j)2 of the Standard Specifications are met.

Back-filling operations for Box Culverts must be performed as outlined in Subarticle 530.03(e) for drainage structures larger than 48 inches in diameter. During the backfilling operation, free draining material meeting the requirements of Subarticle 214.02(b) of the Standard Specifications must be placed around weep holes. A belt of this material must extend the full length of the culvert at the line of the weep holes in the vertical walls. One cubic foot of the material must be placed around each weep hole in the top slab. To prevent the free draining material from passing through the weep hole, filter fabric or hardware cloth must be placed at the opening prior to placing this material. The broken stone should not completely block the opening but must be fractured to allow the seepage of water into the weep hole.

In many cases the plans will call for the extension of existing culverts. Prior to pouring the extension, the wings of the existing box culvert must be removed to the designated limits indicated by Plan Special Drawings. The remaining reinforcing steel must be bent into the walls of the box culvert extension. Construction requirements for the extension will be the same as previously outlined for newly constructed box culverts.

Unless a particular type of culvert is specified on the plans, the contractor shall have the option to select either a cast -in-place or a pre-cast method for construction of the culvert or culvert extension. In some cases the Pre-cast Box Culvert may be specified to be installed as a Pre-cast Structure in the construction plans on a per cubic yard basis. The purpose of Pre-cast Structures is to reduce the installation time once begun. It is felt for this reason that the Pre-cast Unit may be a desired alternative in urban areas where it is imperative that traffic be disrupted for only a minimum period of time.

Engineering

A "Box Summary of Quantities" will be included in the construction plans detailing the location, size, class, linear feet, and type of minor structures to be installed in conjunction with the drainage structure and applicable Special Drawings for each Pipe or Box Culvert to be installed.

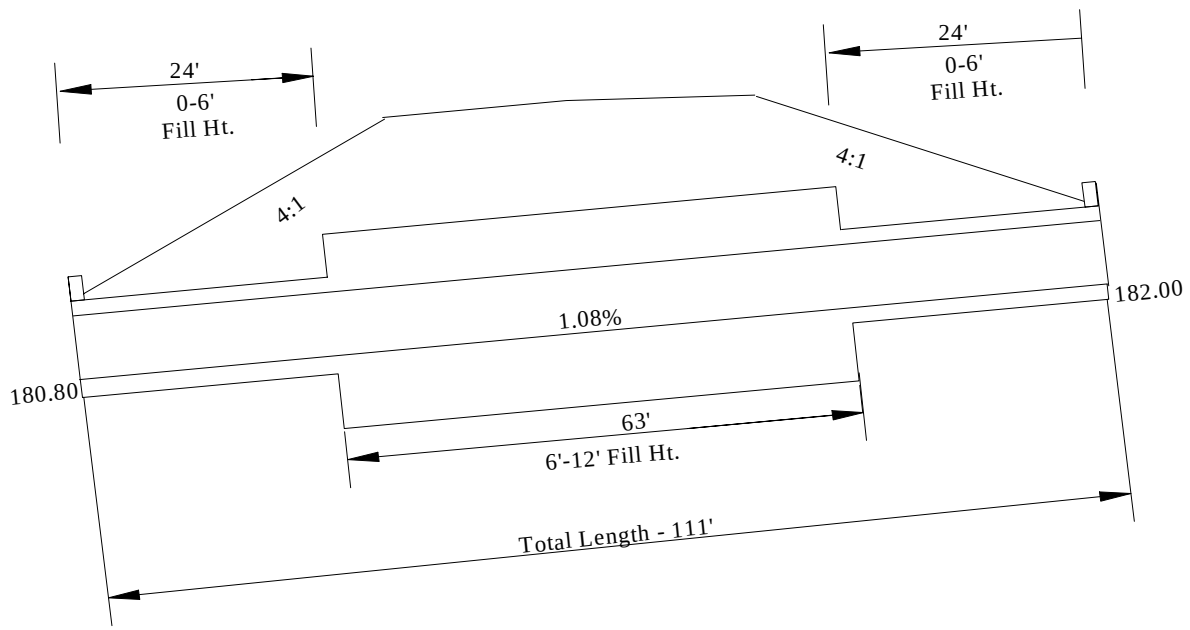
After reviewing the information contained in the construction plans for a particular drainage structure, the Project Engineer should prepare for the taking of a drainage section. An on-site inspection may

immediately reveal that the plan specified location and/or skew of the drainage structure must be slightly changed in order to best fit the existing channel or channel to be constructed. The Project Engineer should take the initiative to make these changes unless some peculiarity of the location requires the structure to be installed as specified.

When taking the drainage section (profile along the centerline of the drainage structure), the profile must be extended beyond the Right of Way line for sufficient distance (approx. 300') to insure satisfactory drainage to the inlet end and from the outlet end of the structure. For drainage structures with inside diameters larger than 48 inches and for box culverts, cross sections should also be taken at 90° to the centerline of the structure for a more accurate computation of Structure Excavation. The drainage section taken by the Survey Party will be plotted on cross-section paper. From specified plan grades, a typical roadway section will be computed for the field established location of the drainage structure. This roadway section will be plotted above the drainage section and fill slopes (adjusted for the skew angle) extended to the plane of the drainage section. The drainage structure can then be drawn and its length and flow-line elevations determined. Other methods are available for establishing the required length of the drainage structure and flow-line elevations and the Project Engineer should use the method in which he/she is most experienced and with which he/she feels comfortable.

From the plotted drainage section the Engineer will record in a field book (Pipe Staking Book), the necessary information (distance to each end of structure from the centerline, centerline station of structure, skew angle, flow-line elevations) along with a sketch of the drainage section. This information will be furnished to the contractor for his/her use in the field staking of the drainage structure. (See 1:2:E:1.13 Page 11 of 48)

CQ 10' x 10' x 111' R.C. Box Culvert
Sta. 915+75 - Sta. 916+17.83



Refer to Special Drawings CQ-1010 (0° skew)
W10-31-0°
CS 3-1

The Engineer should also furnish the Contractor a letter detailing the location, length, size and fill height for each drainage structure to be installed. This letter will establish the length of structure to be ordered and will provide the Contractor with the necessary information for determination of the appropriate Class of Concrete or Gauge of Metal pipe to be furnished.

For a Box Culvert the above information will be furnished to the Contractor in the form of a sketch which, if applicable, further details the culvert designs (Breaks) by fill height. This information is needed by the Contractor in the fabrication of reinforcing steel for the Box Culvert. **A typical sketch showing fill height breaks is illustrated on the previous page. Currently the policy of the Department is to construct new culverts for the maximum fill height for the entire length of the culvert.**

This sketch must be submitted by the Project Engineer, through the District Engineer, to the Division Construction Engineer for checking of accuracy. After the sketch has been checked and corrected as necessary by Division Personnel, it will be submitted to the Contractor for the use of his/her reinforcing steel supplier in fabrication.

After installation of the drainage structures has begun, the Project Engineer will be responsible for taking a final profile or final cross sections when unsatisfactory material is removed below the bottom of the pipe or box culvert. These final profile or cross sections will not only establish the Quantity of Structure Excavation, but also the required Quantity of Foundation Backfill.

For Box Culverts, original and final cross-sections will be necessary at each change in the barrel widths and/or heights. All cross sections (original and final) must be recorded in a level book.

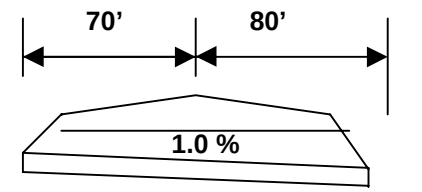
Inspection

The following checklist is provided as an aid to the drainage inspector in the performance of his/her duties.

(1) The drainage inspector should have a copy of the pipe staking book in his/her possession during the performance of his/her duties. The linear feet and/or number of joints of pipe laid or box culvert constructed should be recorded in this pipe book each day and dated. The date the drainage structure is completed should also be entered. The inspector should also make reference to the amount of work performed each day in his/her daily report.

Example of Pipe and Box Culvert Staking Book:

Date staked: 1/16/79
Party: Owens
Sims
Sellers



Req"d. Sta. 501+00
150' 24" R.C. Cl. 3 Pipe O° Skew

Sta.	B.S.	H.I.	F.S.	Elev.
B.M.	5.00	105.00		100.00
0+00				
0+50				
1+00				
1+50				

Offset Dist	Offset F.S.	Offset Elev.	FL Elev.	Cut
10'	1.00	104.00	100.00	4.00
10'	1.10	103.90	100.50	3.40
10'	2.00	103.00	101.00	2.00
10'	1.50	103.50	101.50	2.00
Date	**Joints Laid**	**Lin. Ft. Laid**		
1-18-79	20(4)	82		
1-19-79	18(4)	73	**Completed**	
	152	155		

Ordered <u>150</u> L.F.
Joe Jones

(2) After the drainage structure has been staked and needed cut stakes established, by the survey party it will be the responsibility of the Contractor to construct the structure to the established grade. However, the inspector should make occasional hand level spot checks to insure himself/herself of the accuracy of the Contractor's work.

(3) Has the Survey Party been notified for the establishment of final elevations when excavation below the established elevation for the bottom of the drainage structure is necessary for the removal of unsatisfactory material?

(4) Each joint should be checked to see that it is watertight and that the inside is wiped smooth. Joint opening should be checked to be within required tolerances of Subitem 530.03(d)3a.

(5) Does the method of alignment control being used by the Contractor give the desired results of Item 530.03(a)2.

(6) Are all joints of concrete pipe stamped "DOT" with the Technician's I. D. number and joints of metal pipe properly tagged (Tags must show company name, gauge of metal and heat number; two tags are required for bituminous coated pipe, one to be attached to one end prior to dipping and another attached to the opposite end after dipping)? Has **Form BMT-60** been completed for corrugated steel pipe or corrugated aluminum pipe? Are test reports on file for the linear feet of concrete and metal pipe being installed? Is the pipe of the proper class or gauge?

(7) Are test reports on file for the joint sealing materials being used? If not, are samples being submitted in accordance with frequency of ALDOT Testing Manual?

(8) Are damaged or obviously defective pipe joints being rejected, even though previously pre-tested?

(9) For Box Culverts, are test reports on file for the reinforcing steel being used? Is concrete being furnished from an approved concrete plant and is the plant approval checklist on file? Is a copy of the Job Mix formula on file? Is each load of concrete accompanied by **Form BMT-122**? Are the tests of air content, slump and test cylinders being made in accordance with frequency of ALDOT Testing Manual? Is temperature being checked to determine time allowances for the pouring of concrete? Is **Form BMT-83** being completed for each day's pour?

(10) Does the inspector have a notation in his/her daily inspector's report or preferably a copy of the culvert design sketch, which makes him/her aware of consistant wall, floor or top slab thicknesses or any break points of different designs (changes in wall, floor and top slab thickness, spacing and size of bars, etc.) for the box culvert being inspected?

(11) Are check measurements being made of wall thickness, spacing and clearances of re-steel, etc. prior to pouring? A notation should be made in the inspector's daily report as to the number and type of checks being made. Wall thickness can be checked by cutting a wood block to the specified dimension and inserting it at numerous points along the wall. The top slab thickness and clearance of top re-steel should be checked by stretching a string from wall to wall and measuring down with a ruler. Numerous spacing and clearance measurements should be made for the various sizes of re-bars installed. The inspector, in company with the Contractor's box culvert foreman, should make this in-depth check with deficiencies pointed out as they are found, prior to pouring.

(12) Is the backfill material satisfactory and is it being compacted in six inch layers and brought up concurrently on each side of the drainage structure? Are the mechanical tampers obtaining the desired results? (Density tests should be run on approximately each one foot increment of backfill.)

(13) After form removal on box culverts, are all exposed concrete surfaces being cured with one of the curing methods specified in Item 501.03 (k)1 of the Standard Specifications?

(14) Do the commercial or local materials being used as General Backfill around weep holes and for Foundation Backfill meet the requirements of Article 214.02 of the Standard Specifications? Are these materials being tested in accordance with the frequency of the ALDOT Testing Manual?

(15) Are concrete surfaces being finished in accordance with Subarticle 501.03 (l) unless otherwise specified? Attention is called to the fact that as time elapses after form removal it becomes increasingly more difficult to obtain the required finish.

2:1:E:1.2 Grading and Drainage (Drainage Requirements) Catch Basins, Inlets, Manholes, & Minor Structure Concrete.

Minor Structure Concrete

The item of Minor Structure Concrete is used in the construction of miscellaneous concrete structures, such as specialty junction boxes, specialty inlets, pipe headwalls, steps, etc. where the method of payment for their installation is based on the cubic yards of concrete and pounds of reinforcing steel used.

Basically, Minor Structure Concrete is now used to construct miscellaneous concrete structures which are likely to have varying dimensions in the field, such as junction boxes, inlets, etc. since most standard inlets, headwalls and manholes are now measured for payment on a per each basis.

The locations where Minor Structure Concrete is to be used can be determined from a review of the "Summary of Quantities Box Sheet for Drainage Structures," the plan-profile sheets, which denote the location of various minor structures and the drainage sheets contained in the construction plans.

Usually the required excavation for the accommodation of the minor structure will be performed in conjunction with the excavation of the drainage structure with which it is associated. The method of measuring the amount of Structure Excavation is outlined in Subarticle 214.04 (a) of the Standard Specifications and is thus included on the drainage section sheets previously provided for the associated drainage structure. If unsatisfactory material is encountered at the elevation of the bottom slab of the minor structure, it should be excavated down to satisfactory foundation material and the additional excavation backfilled with suitable material. In many cases, sub-surface or surface water will be present at the structure location and thus the backfill material beneath the bottom slab must generally be a free-draining material as specified for Foundation Backfill.

The Contractor must be required to furnish forms, which after removal, will leave a neat smooth surface appearance. Forms will be of wood, metal or a combination of metal framing with wood panels. The forms should be mortar tight and securely staked and tied so that movement or "buckling" is prevented during the placement of concrete. "Snap ties" will generally be used to tie the inside walls to the outside walls and maintain the specified wall thickness. "Snap ties" should be securely fastened but must not be pulled so tight as to reduce the wall thickness. Spacers cut to the specified wall thickness may be used at various locations throughout the walls to maintain the specified wall thickness. Mortar blocks composed of one part Portland Cement and two parts concrete sand may be used and remain in-place. If wood blocks are used, they must be placed in locations where they can be removed as pouring progresses to the top. All sharp corners should be chamfered, unless otherwise specified by the plans. Forms should be oiled prior to placing concrete to facilitate form removal without damage to the structure.

The size and spacing of reinforcing steel will be detailed on Plan Special Drawings. On rare occasions, the Project Engineer may have to detail the placement of reinforcing steel in a sketch to be furnished to the Contractor for fabrication of reinforcing steel on special junction boxes, drop boxes or inlets of non-standard design. For major structures, non-standard designs should be checked for structural competency by the Central Office prior to installation. The spacing and clearance of re-steel from forms will be accomplished with the use of mortar blocks (composed as outlined above) or with the use of metal chairs.

In most cases, the Contractor will be required to handle water problems during the placement of concrete. Some methods that might be utilized to control this water include damming of water in the

pipe or culvert and allowing it to pass through the minor structure by the use of a bypass pipe or trough, sump holes, pumping, bypass ditch or a combination of these. The inspector should assure, prior to placement of concrete, that the foundation is still in satisfactory condition, suitable on which to place concrete.

Concrete will usually be furnished by a Ready-Mix Plant utilizing a transit mix truck. Prior to placing concrete, it is suggested that the Contractor dampen the inlet and/or outlet structures entering the minor structure to prevent loss of moisture from the fresh concrete. Care should be taken during the placement of concrete so as not to displace reinforcing steel and weep holes. Some methods of placing the concrete in the forms are by tremie, chute or hand shoveling. Concrete should be vibrated during placement and vibration supplemented by spading. Special precaution should be taken to vibrate around inlet and/or outlet structures entering the minor structure to prevent honeycombing. In some cases the minor structure will be poured as a monolith with the exception of the top slab, if applicable.

Immediately after pouring, surfaces not covered by forms should be covered with one of the curing materials specified in Subarticle 501.03(k) of the Standard Specifications. Curing compound will generally be used. After forms are stripped, finishing operations should be performed and curing continued for at least three days. Special attention should be directed to neat finishing around inlet and/or outlet structures entering the minor structure. All surfaces should receive a Class "1", ordinary finish, with all exposed surfaces also receiving a Class "2" or coated finish.

The Contractor should be required to finish exposed surfaces diligently, since the appearance of a minor structure can add greatly to the aesthetic appearance of the project.

Catch Basins, Inlets and Manholes

The location of catch basins, inlets and manholes will be indicated in the "Summary of Quantities Box Schedule for Drainage Structure," Plan-Profile sheets or drainage section sheets contained in the construction plans. In setting the specific location and elevation of the structure in the field, the Engineer must fit the surrounding conditions by giving careful consideration to the final site-grading plan in order to best accommodate drainage and also provide desired safety. An example of the type foresight needed is in the setting of median inlet grades. These inlets will usually be poured prior to the completion of finish median slopes. The inspector must be aware of this situation and thus set the median inlet elevation to intercept the finished slope and not the existing slope. Failure to recognize this factor may result in not only an ugly scar from the deep hole left in the median but also a hazard to the traveling public.

The Special Provisions, Standard Specifications and Plan Special Drawings now provide several alternates in the form of brick, block and/or concrete in the construction of these minor structures. A Pre-cast Alternate for all or portions of these structures may also be provided. The use of a Pre-cast Structure will generally be limited to areas where the size and elevations of the drainage structures entering the Pre-cast box can be accurately pre-determined. If these conditions can not be determined prior to the laying of the pipe line or pouring of the culvert, a cast-in-place minor structure, which can be adapted to field conditions, is the best alternative. Of course the benefit of the Pre-cast unit is its expeditious installation once the drainage structure is installed, thus eliminating a hazard to the public and allowing the next phase of construction to proceed.

The dimensions of the catch basins, inlets, and manholes will be shown on Special Drawings contained in the construction plans. Most of these type structures will usually be provided on a per each basis with separate payment being made for varying heights on a unit basis. Structures which have

wide margins of varying dimensions for adaptation to field conditions, such as junction boxes, will generally be provided on a per cubic yard and per pound of reinforcing steel basis.

Details showing the type and dimensions of grates and manhole covers, methods of attaching grates, location of access steps, and plastering details for manholes will be indicated on Special Drawings contained in the construction plans.

Engineering

The Survey Party will be responsible for the staking of the location for each catch basin, inlet and/or manhole to be installed. Locating will consist of setting "straddle" stakes for crossing out a particular point on the structure or setting two stakes with tacks for the stretching of a string-line along the front or other designated wall of the structure. If the inlet is located within a curb and gutter section, the stakes are usually set for the stretching of a string-line by the Contractor along the face of the curb. Utilizing plan details the Contractor can then construct the drainage structure in proper relationship to the string line.

In addition to providing stakes for proper alignment, the Survey Party must also provide a graded hub or stake in the immediate vicinity of the structure for "leveling over" with a carpenter's level.

After the catch basin, inlet and/or manhole has been constructed, the Engineer will be responsible for measuring the completed structure. These measurements should be recorded in a field book, as to the date taken, location of structure and type structure. The height measurement that is taken will be used to determine the number of inlet or manhole units, if any, for which the Contractor must be paid. If payment for a portion of or for all of the inlet is on a cubic yard and pounds of reinforcing steel basis, the measurements will be used by Project Office personnel to accurately draw the structure and compute pay quantities.

Inspection

The following checklist is provided as an aid to the Inspector in the performance of his/her duties:

1. Is the alignment and elevation of the inlet set such that it will adequately receive the drainage area and provide the maximum degree of safety to the traveling public?

2. Is the foundation for the minor structure satisfactory? Has depth of unsatisfactory material removal, if any, been measured and recorded? Is the bypass of surface and/or sub-surface water being handled in such manner that it does not disrupt the foundation preparation or cause damage to the fresh concrete?

3. Are sharp corners of forms chamfered? Are forms sufficiently tied to prevent buckling during pouring and vibrating? Are forms oiled to aid in removal and prevent loss of moisture from the concrete?

4. Have checks of wall thickness, size and spacing of re-bars, size and placement of weep holes been made and results recorded in Inspector's Daily Report prior to pouring? Are two vibrators on hand prior to pouring? Have all old concrete surfaces been properly chipped to remove all laitance down to sound concrete? Has all debris been removed from within the forms and from all bonding surfaces prior to pouring? (Blow out with compressed air or wash out with water).

5. Are wood blocks being used as wall spacers? If so, are they located so they can be removed as pouring progresses?

6. Generally a ready mix plant will furnish concrete with a transit mixer. If so, are all loads of concrete accompanied by **Form BMT-122**? Are slump and cylinder tests being made in accordance with frequency of ALDOT Testing Manual? Is **Form BMT-83** being completed for each day of pouring?

7. Are test reports on file for reinforcing steel, brick, block, pre-cast units, grates and/or covers curing material, expansion material and sealer?

8. Is the plastering of manholes being performed to the limits specified on Plan Special Drawings? Are access steps installed at specified intervals?

9. Is the curing and ordinary surface finish being pursued immediately after form removal?

10. Does the material being placed around weep holes meet the requirements of Subarticle 214.02 (b) for General Backfill? Is this General Backfill being tested in accordance with frequency of ALDOT Testing Manual for Section 214? Are test reports of file?

11. Are Plan Special Drawings available to the Inspector for proper checking of the installation as it progresses?

2:1:E:1.3 Grading and Drainage (Drainage Requirements) Curb, Gutters and Combination Curb and Gutter

Description of Work.

The layer of material on which curb and/or gutter is to be placed will be shown on the Typical Section Sheet of the construction plans. Density requirements for the portion of the layer directly beneath the curb and/or gutter will be the same as required for the entire layer width. The Contractor may elect to obtain density on the previously spread layer for only a width sufficient to accommodate the curb and/or gutter, pour the curb and/or gutter and then obtain density on the remaining width of the layer between the gutter lines after the curb and/or gutter is in-place. This procedure is permissible provided the method of compaction adjacent to the gutter line is such that no damage will occur to the poured structure and provided compaction on the remaining width is pursued immediately after the curb and/or gutter is poured. This outlined sequence of compaction will generally be used where a soil and aggregate type base underlies the curb and/or gutter, since any density obtained prior to pouring the curb and gutter will be lost during the pouring operation as a result of the turning and twisting action of the transit mix trucks delivering concrete. Where Bituminous Plant Mix underlies the curb and/or gutter, full width compaction of the layer should be required prior to commencing the pouring of the curb and/or gutter. The "wedge" of material which is required in order to construct the gutter to the proper slope within a curb and gutter section will be placed and compacted. In lieu of constructing this "wedge" with the same material as the underlying layer, the Contractor may request that he/she be allowed to pour this "wedge" with concrete, monolithic with the pouring of the curb and gutter. The additional concrete should be furnished without extra compensation.

The curb and/or gutter is normally placed with the use of a curb machine and/or forms. When forms are used all forms must be securely staked, braced and held together to the lines and grades established. Metal forms consist of a back form, face of curb form, face of gutter form and usually metal templates, conforming to the curb and/or gutter section, with all components tied together and pinned. The metal templates are generally spaced at ten foot intervals and aid the Contractor in the screeding of the concrete to the required section. These metal templates must not extend beyond a point two inches below the finished gutter. After the concrete has set sufficiently to stand on its own, the curb face form will be removed to allow finishing of the curb face. All forms must be cleaned and oiled with a suitable form oil immediately before concrete is placed against them. Spacing of expansion and/or contraction joints will be specified on Plan Special Drawings. The top and inside edge of forms should be "eye balled" to note any obvious irregularities in alignment and grade prior to pouring. All loose material inside the forms should be removed and the foundation wetted prior to placing concrete. Flexible forms used to construct radii or structure tie-ins may be metal, fiber or of a material suitable to adequately perform the work. Flexible forms require closer spacing of stakes to obtain the rigidity that is needed.

Concrete will usually be furnished from a ready mix plant with the use of a transit mix truck and will be discharged from the truck directly to the forms. The concrete should be placed in the forms full depth in one operation. It should then be tamped, spaded or vibrated. Particular attention should be given to spading and vibrating along the back and inside forms to prevent honeycombing. The concrete should then be struck off and the exposed surface finished with a wood float. The final surface finish should be obtained by brooming, burlap drag or cotton fabric drag to produce a uniform gritty texture. The edges and radii of the curb and/or gutter should be finished with edging and radius tools to comply with the curb cross section shown on the construction plans.

Immediately after finishing, the concrete should be cured with one of the curing agents specified in Subarticle 450.03(m). The Contractor will generally use membrane-curing compound applied through the use of a hand sprayer.

Forms should not be removed until the concrete has set sufficiently to prevent damage to the completed work. After forms are removed, minor defective areas (honeycomb) should be repaired with concrete mortar.

After form removal and repair of defective areas, the area behind the curb and/or gutter should be backfilled immediately. During backfilling operations, care should be taken so as not to disturb the curb alignment. Early backfilling will prevent pockets of water from standing along the back of the curb and possibly saturating the pavement structure buildup or subgrade.

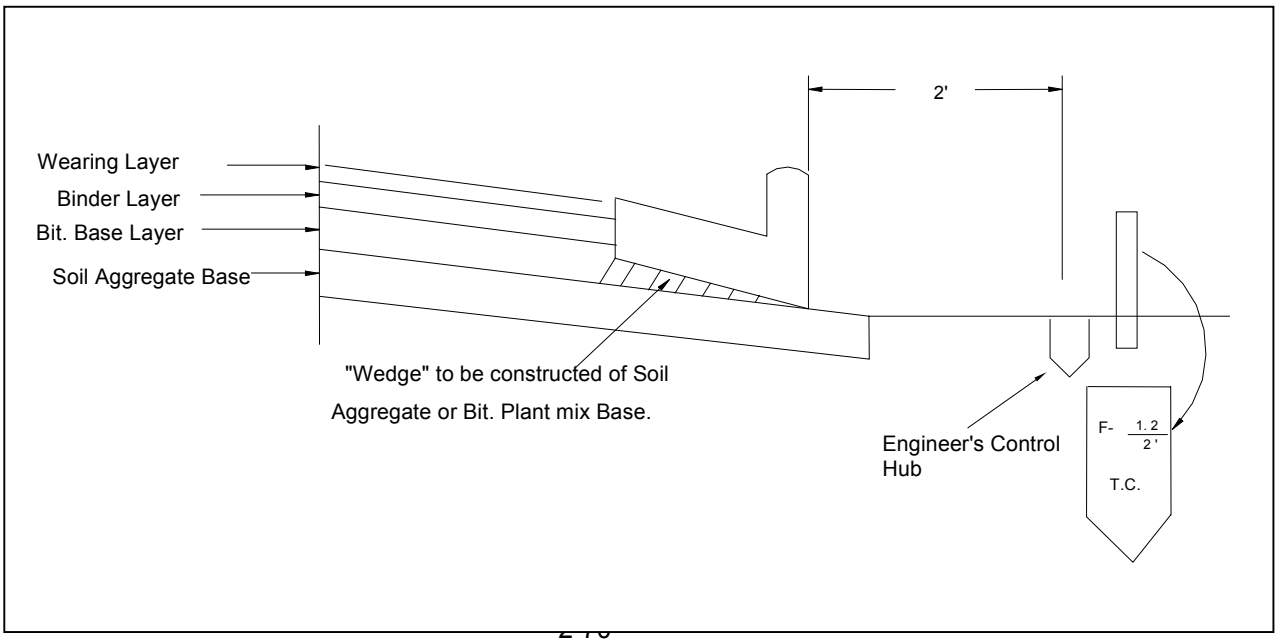
In lieu of metal form construction, the Contractor may use an extrusion type curb and/or gutter machine. The machine must be capable of placing the curb and/or gutter to the dimensions, cross section, lines and grades within the desired tolerance. The machines presently being used can produce a variety of curb sections by the use of interchangeable molds. The line and grade produced by the machine is generally controlled through the use of a string line.

Engineering.

The Summary of Quantities Box Schedule will indicate the location by station and the type of curb and/or gutter to be placed at each location. In addition, the location will be shown on the Plan-Profile sheets and/or Paving Layout sheets. The Typical Section sheet will also usually indicate the type curb and/or gutter to be placed in a particular area and the layer of material on which it is to be constructed. Detailed dimensions, type joints and joint spacing will be shown on a Plan Special Drawing.

Utilizing the above referenced sheets, the Contractor will be responsible for staking the curb and/or gutter for construction to the proper line and grade. The staking procedure generally consists of a hub and tack at a maximum spacing of 50 feet. These control points are offset approximately two feet back of the back of curb. The spacing of the control points is decreased as the percent of grade decreases and may be as close as ten feet when the percent of grade is approximately flat, especially in intersection areas where drainage is very critical. Each control hub will have a grade stake driven behind it with the appropriate fill from the hub elevation to the top of curb written on it. Alignment and grade should be checked as per item 623.03(h)2

This staking procedure is detailed in the following sketch:



In order to establish the top of curb grades at intermediate points between the control hubs; the Contractor will set iron pins to the top of curb grade at each control hub. A taut string line will then be stretched from pin to pin. Utilizing a carpenter's level, the Contractor can level over to the top of curb grade at any point along the curb line.

After the curb and/or gutter has been poured, the Engineer will be responsible for measuring the linear feet poured. Measurements will be made in accordance with Article 623.04 of the Standard Specifications. Measurements should be recorded in a field book by date of measurement, location and type of curb and/or gutter.

Inspection.

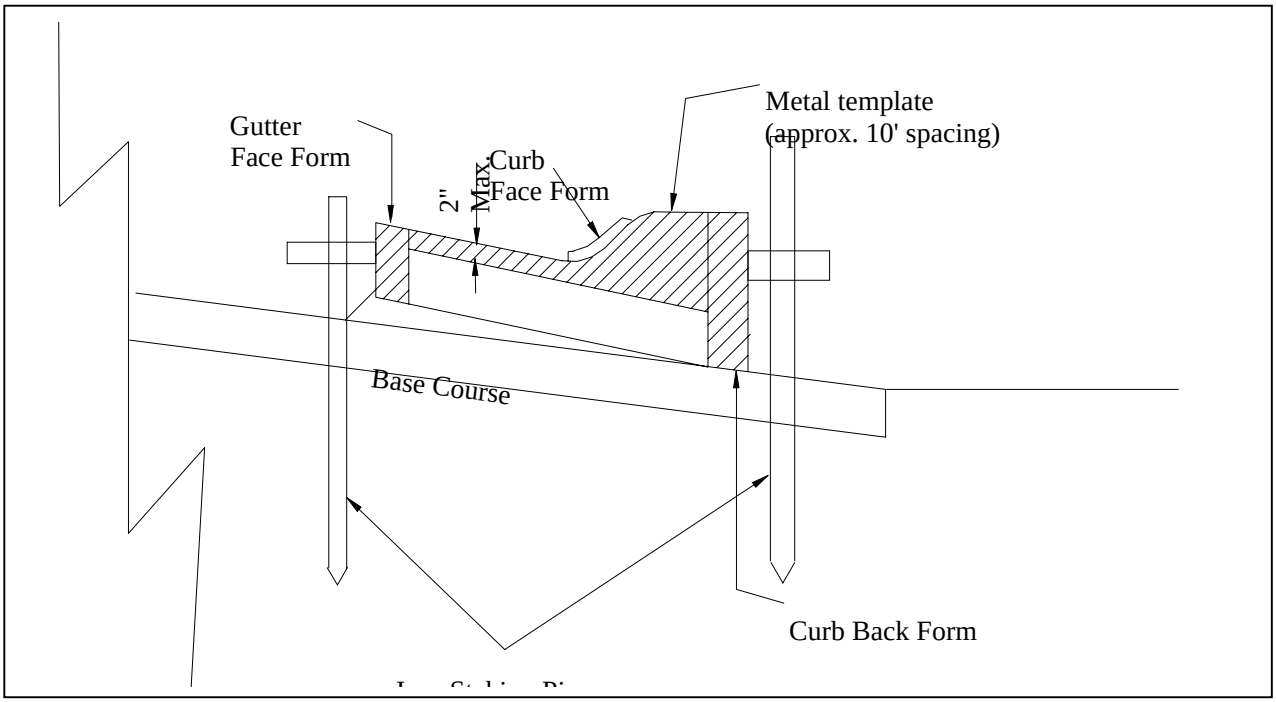
The following checklist is provided to aid the curb and/or gutter inspector:

(1) Has the appropriate density for the layer underlying the curb and/or gutter been obtained prior to pouring?

(2) Are metal forms in a satisfactory condition to provide a section to the specified dimensions, line, grade and straightedge requirements?

(3) Is the Contractor's string-line grade correctly set according to the control hubs? From an "eye ball " view of the established string line, are there any obvious incorrect grades? Has line and grade been checked and documented as per item 623.03(h)2.

(4) Are forms being substantially pinned and tied together to prevent movement during the placement and vibrating of concrete? A typical form set-up for a curb and gutter section is as indicated by the following sketch:



(5) A ready mix plant utilizing a transit mix truck will usually furnish concrete. If so, are all loads accompanied by **Form BMT-122**? Are cylinder and slump tests being made in accordance with the frequency of ALDOT Testing Manual? Is **Form BMT-83** being completed for each day's pour?

(6) Does the completed section comply with the dimensions and cross section shown on Plan Special Drawing? Does the completed pour meet the straightedge requirements of Item 623.03(h)2 of the Standard specifications? Are all deficiencies being recorded in the Daily Inspector's report?

(7) Is backfilling behind the curb and/or gutter being required immediately after the concrete has set sufficiently? Is it being performed in such a manner as not to disrupt the alignment of the curb and/or gutter?

(8) Is the spacing of expansion and contraction joints in accordance with Plan Special Drawings? Is the expansion joint filler material and sealer material of the type specified by Plan, Special Drawings or Section 832 of the Standard Specifications? Are test reports on file for these materials?

(9) Is curing being performed with one of the curing methods specified in Subarticle 450.03(m)? Are test reports on file for the curing material?

(10) During construction and prior to final roadway layers, will new Curb & Gutter create a drainage problem or cause saturation of Permeable Asphalt Layers? If so, contractor should saw cut or block out at low points and at inlets to allow water to leave roadway

2:1:E:1.4 Grading and Drainage (Drainage Requirements) Pipe Underdrain, Aggregate-Filled Underdrain and Prefabricated Drainage Mat Drain

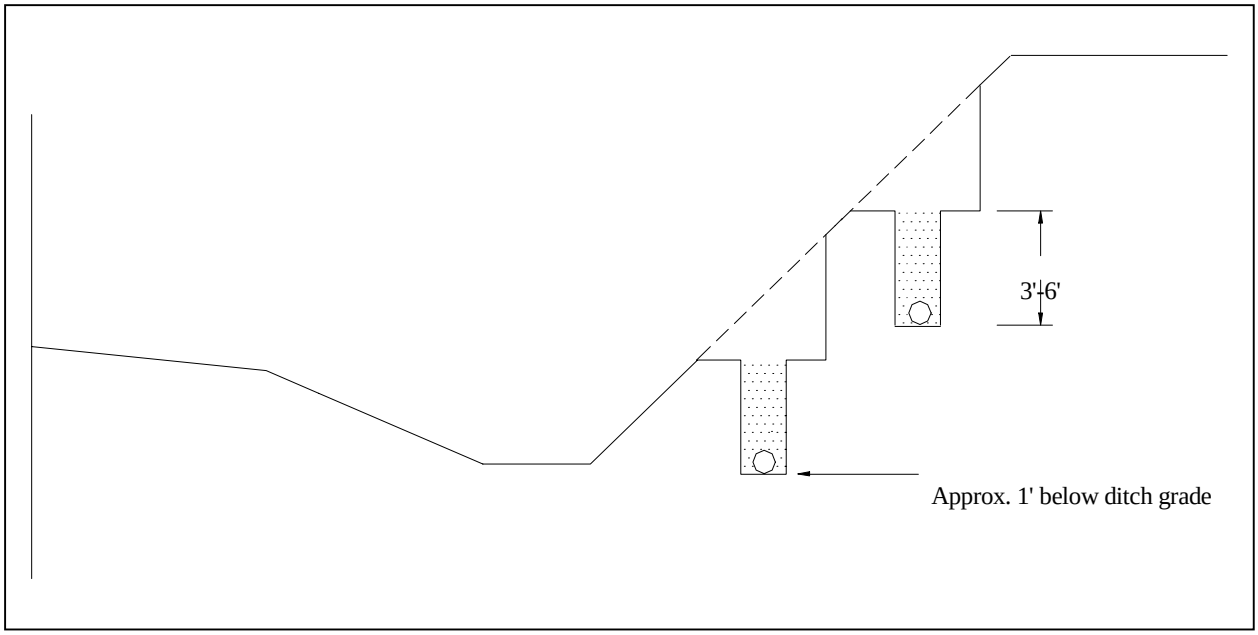
Description of Work

The purpose of an underdrain installation is to intercept and lower the level of sub-surface water in order to eliminate backslope slides and possible early deterioration of the roadway structure. In some cases underdrains are also used to lower the water table in the area of box culverts and other concrete structures, such as retaining walls, to reduce the possibility of long time settlement.

The location for certain underdrain installations will be shown on the Plan Typical Section sheets and/or Plan-Profile sheets However, the location of most underdrain installations, which are used for the purpose of intercepting sub-surface seepage, will be established as the construction work progresses. These locations are established through observations made by the Contractor, Project Engineer and Inspectors as to seepage from cut areas, pumping of subgrade, sliding of slopes, etc.

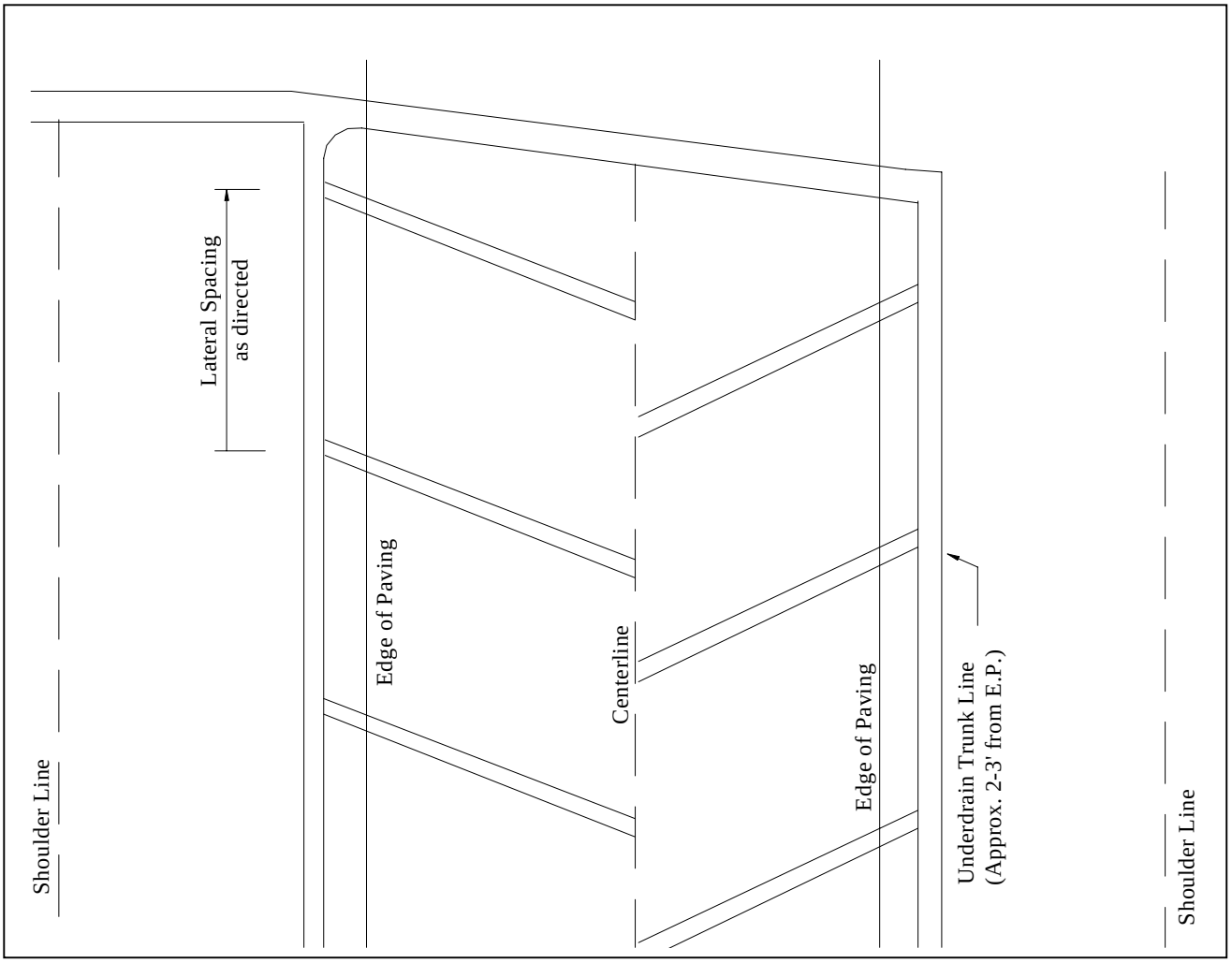
The method of installing the underdrain systems is left to the discretion of the Contractor provided a final installation is obtained conforming to the elevation established by the Engineer and details shown on the Plan Special Drawings. Equipment used will generally consist of backhoes or trenchers for excavation, dump trucks for the hauling of filter material and front end loaders for transferring filter material from stockpiles to the trench. In certain installations, such as Aggregate-Filled underdrain installed longitudinally along the edge of pavement, the Contractor may use a spreader running parallel to the edge of paving and depositing material directly into the trench as it is dumped into the spreader from the transporting vehicle.

Installations in back slopes will require the benching of the slope prior to beginning excavation of the trench. Details will normally be provided in the plans. One method of "drying" a back slope and hopefully reducing the possibility of a slide or infiltration of water into the roadbed is detailed in the following sketch:



The flow-line of each succeeding line of underdrain progressing up the slope would correspond to the top of the filter material installed on the previously laid line. The area of seepage is usually located close to the bottom of the cut thus requiring only one or two lines of underdrain. The location of the underdrain is critical in controlling back slope slides and is usually only of benefit if the potential slippage surface for the slide is very shallow.

Installations within the roadbed area in order to control sub-surface seepage can take a variety of patterns. If it is known that the water is entering the roadbed from one side of the cut section at an elevation below the ditch line and thus no potential problems in the back slope, a line of underdrain down the shoulder line on this one side may be sufficient to cut the seepage off from the roadbed. If it is not known from which direction the sub-surface water is entering and the quantity of seepage is substantial, a line of underdrain down each shoulder with a "herringbone" pattern to the centerline may be required to adequately stabilize the roadbed. The following sketch illustrates this type installation:



Sometimes Typical Sections will indicate an underdrain installation back of the curb in a curb and gutter section. These underdrains should be installed only within the sections of curb and gutter that are known to have sub-surface water or where the area back of the curb is flat with little drainage ahead or back thus allowing the water to stand and possibly penetrate the pavement structure buildup.

The Department utilizes drains installed parallel to the edge of paving for the purpose of draining the base buildup structure. Currently the Department utilizes two types (1) Aggregate Filled Underdrain and (2) Prefabricated Drainage Mat Drain. The depth of these edge drain installations is shown on the Plan Typical Section sheets and is generally to the bottom of the subbase or improved roadbed layers. Prior to placing aggregate in the trench of an Aggregate Filled underdrain, the sides and bottom of the trench are lined with a Geotextile Filter. Geotextiles will deteriorate in the presence of sunlight and should not be allowed to lay out along the roadway for a period greater than 14 days prior to installation without some type of opaque covering. Aggregate-Filled underdrains are presently being installed without the use of pipe with the exception of a perforated pipe section in the last ten feet of trench and a non-perforated outlet pipe.

For underdrains being installed for the purpose of intercepting sub-surface seepage, the depth of installation is probably the most critical phase of constructing the facility. Considerable engineering judgment is necessary to establish the flow-line elevation to satisfactorily intercept the water. Normally, for roadbed installations, a depth greater than six feet will not be necessary. In back slope installations, through the use of benching, it is hopeful that the depth can be held to three feet and no greater than six feet. However, it must be stressed that the exact depth can only be established using the best of engineering judgment based on field conditions at the time of installation.

If perforated pipe is used in the underdrain installation, the perforations must be down. If the perforated pipe is used as an outlet for transporting water from the under drain, the perforations can be turned up and covered with roofing paper prior to backfilling. Non-perforated pipe may also be used as underdrain outlets.

Engineering

The location and depth of installation for pipe underdrains to be placed back of curb and gutter sections and for Aggregate-Filled underdrain or Prefabricated Drainage Mat drain placed along the pavement edges will be shown on the Plan Typical Section sheets. As previously stated pipe underdrain should only be utilized within the specified curb and gutter sections if sub-surface water is present or if flat grades cause the area back of the curb to be susceptible to surface water penetration. The location for underdrain installations may also be shown on the Plan-Profile sheets. However, in most instances where underdrain is being used to intercept sub-surface water, a contingency quantity will be provided in the contract and will be used at the Engineer's discretion in areas where sub-surface water is noted during construction.

Several alternate types of underdrain are provided by the Standard Specifications and the Contractor may use any one of the alternates allowed in the contract pay item. Types should not be mixed within a particular installation site.

The installation details regarding width of trench and type filter material to be used with the various types of pipe underdrain will be detailed on Plan Special Drawings. For Aggregate-Filled underdrain, or Prefabricated Drainage Mat drain installation details are usually shown on the Typical Section sheets with outlet details also being shown on a Plan Special Drawing.

The Survey Party will be responsible for staking the location and elevation of the underdrain as established by the Engineer. The setting of control hubs basically will be as previously outlined in 1:2:E:1.13 page 11 of 48.

A profile of the existing ground surface must be taken along the proposed location prior to beginning excavation. This profile will be plotted by office personnel, along with the flow-line elevations of the pipe underdrain, for a determination of any necessary extra depth adjustments in contract unit prices. A plan view showing the location of the underdrain in relationship to the project centerline should also be drawn above this profile. This plan and profile view of the underdrain installation should be included as a part of the record set of plans furnished to the District Engineer. This information will prove invaluable to him/her in later locating of the installation for maintenance purposes should such be necessary.

Prior to backfilling with filter material, pipe underdrain should be measured and measurements recorded in a field book as to date of measurement, location, type underdrain and length installed.

Inspection

1. Has the Survey Party taken the required profile of the existing surface along the proposed under-drain location prior to excavating?

2. Is the trench being excavated to the established elevation and to the dimensions specified on the Plan Typical Section sheets and/or Plan Special Drawings?

3. Is one of the two types of filter material for Aggregate Filled underdrain required by Special Drawings for the type underdrain being installed? Does Type A (coarse filter material) meet the gradation requirements for the material being used (ALDOT 710, 67 or 78)? Does Type B (fine filter material) meet the permeability requirements of Subarticle 853.10(b)? Is the aggregate being used for Aggregate-Filled Underdrain of the type specified by the plans or one of the types allowed by the Standard Specifications?

4. Is Prefabricated Drainage Mat drain being used included on the Department's MSDSAR list.

5. Are test reports on file for pipe, Type A filter material (gradation), Type B filter material (gradation and permeability), Aggregate for Aggregate-Filled underdrain (gradation and permeability), and Geotextile Filter fabric?

6. Is the filter material being placed to the height specified by Plan Special Drawing or as directed by the Engineer?

7. Are perforations of perforated pipe being laid in a downward direction? If perforated pipe is used only for the purpose of transporting water (outlet), are perforations turned up and covered with roofing paper prior to backfilling?

8. Have measurements been made and recorded for underdrain outlet lengths? Has depth measurements been made and recorded so that appropriate price adjustments, if any, can be made?

2:2: **BASES**

2:2:A **(Soil, Soil Aggregate, and Aggregate Base and Subbases)**

Description of Work

The purposes of a Base or Subbase course are to distribute the wheel loads that are transmitted to the embankment, to provide a free draining material between the pavement surface and subgrade and to provide a non-frost susceptible material on which to support other bases or surface courses. Materials used for Bases and Subbases will consist of Soil and/or Aggregate materials or Processed Reef Shell materials obtained from natural deposits in local pit sources, from commercial sources or from a combination of local and commercial materials.

Materials secured from local pit sources will be excavated from the pit utilizing backhoes, drag-lines, dozers and/or front-end loaders. Local pit operations will basically consist of excavating full depth of the pit face and depositing the excavated material in a stockpile. In order to maintain consistency in the materials received at the Project site, the pit operation should be conducted in the area of the pit that has been drilled and tested for specified requirements. Local materials, which are to be combined with other additives, such as commercial aggregates, cement or lime, may be hauled to the roadway and additives spread over the local material for Road Mixing. However, the addition of additives may also be designated to be performed by Yard Mixing or Plant Mixing prior to delivering to the roadway.

Road Mixing

Generally, Road Mixing will always be provided for Base and Subbase materials, which are used in their natural state without the requirement of further blending with other components. However, if provided in the contract, Base and Subbase requiring additives may also be Road Mixed. Provisions are now available allowing the use of Road Mixing in cement and lime treated bases, which in the past were required to be Plant Mixed. The addition of commercial aggregates is generally accomplished by Yard Mixing but may also be performed by Road Mixing if allowed by the contract.

In Road Mixing, material from the local pit will be delivered to the roadway in dump trucks and dumped directly onto the subgrade or underlying base layer. The spacing of the dumps will be controlled by the Contractor such that after spreading, usually with a motor patrol, the loose thickness of the layer will be such as to provide a final compacted layer thickness of that shown on the Plan Typical Section sheet. After the loose spreading of the local material, any additives which are allowed by the contract to be incorporated through Road Mixing will be spread. The spreading equipment used in spreading the additives must be such as to provide a uniform coverage to the plan designated percentage. Payment for additives, especially lime and cement, is usually on a per ton basis and therefore it is mandatory that the rate of spread be accurately controlled.

After spreading, mixing operations will begin. The dumping and spreading operations that take place ahead of mixing should be limited to materials that can be processed in one day's operation as required by Item 30l.03(c)3 If this requirement is not enforced and the material is allowed to lay out for a long period of time in a loose condition prior to mixing and compacting, saturation and loss of density in the underlying subgrade may result. Mixing will consist of the use of motor patrols to manipulate the material into and out of windrows, rotary mixers and/or disc harrows. Where cement and lime is used as an additive, it is usually imperative that a "travel-type" mixer be used for uniformity of mixing and incorporation of moisture. The "travel-type" mixer is a self-contained unit that is capable of picking the

material up from a windrow, mixing the material within the unit as moisture is being added through spray bars and then depositing the material in a uniform layer as the mixer continues along the roadway. One of the most important steps of the mixing operation is the addition of moisture to bring the percentage within (±) 2% of optimum moisture content. It is mandatory that the moisture be added during the mixing stage in order to obtain uniform distribution of moisture throughout the full depth of the layer.

After the base and/or subbase materials have been mixed until uniform in color and texture, compaction operations will begin. Compaction is accomplished by pulling the material in from windrows in two to three inch layers with concurrent rolling of the thin layers. Rolling is performed with the use of sheepsfoot; grid, vibratory sheepsfoot, vibratory steel-wheel and/or rubber tired rollers. The type roller that will give the best compaction effort will depend on the type material being rolled. A sheepsfoot and/or grid will generally be best for a predominantly soil type base whereas a vibratory steel wheel will be best for a predominantly aggregate type base. Rubber tired rollers are basically used for sealing of the layer and obtaining a small increment of the specified density by rolling on top of the completed layer.

In some cases it will be difficult to obtain the required percentage of laboratory density and the Contractor might request that he/she be allowed to use the "Control Strip Method" of density control in order to obtain the maximum density required in the field. The "Control Strip Test Method" should only be allowed after the Project and Division personnel are satisfied that the Contractor has exerted all reasonable effort to obtain compaction in the way of alternate type rollers, several attempts at re-mixing and re-rolling, and all compaction equipment loaded as required (steel wheel and sheepsfoot drums full of water, etc.).

After the layer has been compacted for its entire depth, the Contractor utilizing the grade control hubs will set "Grade (Blue-top) hubs". The layer will then be "clipped" to the hub elevations with a motor patrol and sealed with a rubber tired roller. Density will be maintained by periodic watering and rolling until such time as the layer is covered with the next overlying layer or until the layer is primed. If a primed layer is exposed for an extended period of time prior to placing the bituminous treatment or plant mix layer, it is possible that the layer, even though primed, may lose the required density. The Standard Specifications and/or Special Provisions allow the Engineer to use his/her discretion in the re-testing of primed layers immediately prior to placing the next overlying layer. If density is found to be deficient, the Contractor has the responsibility of bringing the layer back to the required percentage. Usually only two or three percentage points will be lost and can be restored by watering and rolling with a medium size roller (10-20 ton rubber tired).

Yard Mixing

Yard mixing is basically provided for Bases and Subbases that are to be composed of two or more components, for Bases and Subbases that are to be placed immediately above a drainage plane layer on Special Design Shoulders and for Bases and Subbases that are to be placed on Special Design Shoulders of insufficient width to accommodate Road Mixing. Yard Mixing may also be provided in urban areas for materials used in widening, etc. in order to limit the amount of exposure time to traffic through the elimination of the mixing operation at the project site.

The basic difference between an item of Base and/or Subbase that is to be Yard Mixed as opposed to Road Mixed is in the mixing process as is implied by the description. Yard Mixing will be performed in a prepared area of a local material pit or other area furnished by the Contractor but must be sufficient in size to accommodate the mixing operation. The local material will generally be spread approximately one foot thick for a length of 100' to 300' and width of 24' (These dimensions may vary considerably

depending on the quantity of Yard Mixed material required by the project and the size of the mixing area).

Any additives to be blended with the local material will then be spread over the layer of local material. Since the Yard Mixed layer will be tested for specification gradation requirements after it has been compacted in-place on the roadbed, the Engineer will usually not be too concerned with the quantity of aggregates incorporated but the Contractor will be very interested in controlling the added quantity for economic reasons.

After all materials that are to make up the Yard mixed item has been spread, the mixing operation will begin. Mixing equipment will consist of alternate windrowing with a motor patrol and discing or rotary mixing. During the mixing operation sufficient water will be added to bring the material to a moisture content that will be within ±2% of optimum when it arrives at the point of placement. Thus, any further mixing and adding of water at the project site will be eliminated and the compaction process can begin immediately after the material is spread.

The spreading of Yard mixed material should usually be accomplished with the use of a mechanical spreader. This method of spreading will aid in preventing segregation of aggregates or additives, thus providing a better quality of consistent Base or Subbase, as well as being advantageous to the Contractor in that the material is more likely to meet specification gradation requirements once it is compacted.

Compaction of a Yard mixed layer will be performed in the same manner as previously described for Road Mixing.

Plant Mixing

Plant mixing is regarded as being a means of obtaining the highest quality of Base and/or Subbase material possible. It is generally used for certain Bases or Subbases composed of two or more materials, for cement or lime treated Bases or Subbases and almost always used for Crushed Aggregate Bases. With the use of Plant Mixing, the breakup and segregation of aggregates or additives, normally encountered with Road and Yard Mixing, is virtually eliminated. To further eliminate this breakup and segregation of aggregates or additives, it is desirable and should be required that Plant Mixed Bases or Subbases be spread through a mechanical spreader and not dumped directly on the roadbed.

The Contractor will usually provide a mixing plant in the vicinity of the project site, or if for Crushed Aggregate Base, it will usually be provided in the Pit or Quarry area. After the plant has been installed, the Division Materials Section will work with project personnel to insure that all batching volumetric and mixing equipment of the plant meets the requirements of Item 301.03(c)4 After these checks have been made, the Contractor will be responsible for properly calibrating the type plant being used in such manner that it will produce Base or Subbase materials containing the specified percentages of additives and meeting specification gradation requirements when in-place. The Project Engineer, with assistance from the Division Materials Section, will be responsible for checking the Contractor's calibration. His/her check may be performed in conjunction with the Contractor's calibration procedure. The Contractor will be required to furnish all equipment (dump trucks, scales, etc.) needed in the calibration process.

For a batch type plant, the calibration will consist of adjusting the weights of the different additives being introduced until the plan specified percentage of each component or percentage of each component that will produce a mixture meeting specification requirements is obtained. The materials are weighed on scales approved during the plant check by the Division Materials Section. For a

continuous mixer, volumetric proportioning based on the weight of the materials will normally be used. Each material must be introduced through a metering device which can be adjusted to introduce the required amount of material and which is so synchronized and interlocked with the other feeders that a Constant ratio of each aggregate, cement or lime if specified, and water is maintained at all times. The volume -weight -time calibration must be determined for each feeder prior to starting production so the Inspector can determine that proper ratios of material are used. Depending on the type of equipment used by the Contractor, aggregate feeder calibration normally will be based on variable gate setting with constant feed-belt speed, or constant gate setting with variable feed belt speed. Vibrator feeders or other special types also may be encountered that will require special attention in checking calibrations. In any case, the Inspector should determine that the feeders are in good repair and function properly, and that uniformity of feed can be maintained. Storage hoppers over the feeder must be so constructed that the separate materials cannot intermix, and each hopper should be equipped with an automatic signal device or have other means which will indicate to the Inspector and the operator when a shortage of material occurs in the hopper or when the feed gate is blocked. This trouble is serious. The Inspector must make sure it can be spotted promptly when it occurs. Inclined feed belts should be equipped with an automatic braking system to prevent roll back on stopping plant operation. If the belts are not so equipped, it will be necessary to stop the feeders and run the feed belts until all material is in the Pug Mill before stopping the plant. On emergency stops, improperly proportioned material will have to be wasted.

Cement or lime when specified may be added to either the aggregate feed belt or directly to the mixing plant. Many plants use an auger-type feeder, with the amount of cement or lime added being controlled by the speed of the auger. Means for checking calibration of the cement or lime feed and adjusting and controlling the rate of feed are required, and an automatic signal system, which will indicate a shortage or blockage of cement or lime in the feed hopper, must be used. The Inspector must check frequently to make sure the cement or lime is feeding uniformly. Cement or lime feed will be synchronized and interlocked with the aggregate feeders. The most common means of achieving interlock is to power all feeds from the same power source. When calibrating the cement or lime, it is good practice to have all other elements of the plant operating, as ground vibration may affect the amount of cement or lime obtained from any given auger speed setting. If air is introduced or vibrators are used in the silo during checking of calibration, the same procedure should be maintained during production. For the benefit of the new Inspector, checking the calibration of the feeders is simple. First find the weight per cubic foot of each component separately. Next, with the plant running open a feeder gate and after the component is running on the belt, catch in a weighed, empty truck the amount that discharges in a given accurately measured time. Choose a time that about fills the truck. Weigh the amount discharged. This gives you the rate of discharge. Repeat this for each component. From the volume-weight ratio and the rate of discharge, you can figure the volume of weight of each component discharged per minute. If the resulting proportions do not agree with those specified on the plans, the Contractor must recalibrate.

The feeders should be checked by very carefully measuring the volume - weight - time ratio of each feeder under working conditions (plant running) and adjusting the gate opening (or belt speed) by trial until the required ratio is obtained that will produce the specified proportion of each component of the mix. When checking the calibration of the various feeders, sufficient quantity should be run for each test to insure accuracy of weighing and to minimize the effect of minor weight inaccuracies. For aggregates, each test run should approximate a dump truck load of material. For cement, a barrel or other such container is the smallest that will suffice. The Contractor should be alerted to have at least two dump trucks available during calibration.

After the Contractor has calibrated all feeders, the Project Engineer and calibration process Division Materials Engineer should check the calibrations before approving the plant, or if preferred they may

collaborate with the Contractor in his/her calibrations. After calibrations have been made and found correct, means should be provided so that they cannot be changed without the knowledge of the Inspector. Re-calibration should be required at any time during operations when there is cause to suspect that the proportions of components of the mix are not running true.

The Pug Mill type continuous mixer generally is used for mixing cement or lime treated base or subbase material. It should be inspected to determine that the paddles are not worn excessively, that the speed of paddle rotation is as recommended by the manufacturer, and that the production rate does not exceed the manufacturer's recommended production rate for the plant. In general, the following procedure should be followed for satisfactory mixing:

The cement or lime and aggregate should be introduced at the extreme closed end of the Pug Mill. The flow from the main feed belt should be centered to cause a uniform distribution in the Pug Mill.

The bulk of the mixing water should be introduced near the closed end of the mixer, preferably after about two feet of dry mixing action and so arranged that uniform blending results. The mixing action should be such that the material crowns over the paddle tips no more than about two inches throughout the second half of the mixer. To achieve complete mixing, it is necessary in many cases to reverse the last row or two of paddles so they tend to throw the material back into the Pug Mill. It may be necessary in some cases to reverse other paddles to achieve a thorough mix. Holdback gates at the open end of the Pug Mill should be adjusted in a raised position to help retain the mix in the Pug Mill. The completed mix must be batched in a batching or surge hopper at the open end of the Pug Mill prior to dumping into the hauling trucks. Segregation might occur if the mix were allowed to fall free from the Pug Mill to the truck. Inspection should determine that a satisfactory uniform mix is delivered from the Pug Mill to the hauling equipment. Cement or lime content should be determined by taking a sample from the belt before it enters the Pug Mill. Gradation limits and cement or lime content will be given in the plans or covered in the specifications. Moisture content must be adjusted at the plant to meet requirements at the placement end of the job, which will require close contact between plant and road inspectors.

Although plant requirements are specified in detail in the specifications, it must be noted that the Contractor may substitute other satisfactory mixing plant equipment, with the approval of the Construction Bureau on a trial basis, of course, and subject to continued satisfactory performance. New and improved equipment is being developed from time to time and it is not intended that improved mixing methods be barred by these detailed requirements. However, in no case should the Contractor be allowed to begin producing pay quantities of mixture until equipment is approved and the Project Engineer so notified.

Engineering

The Plan Typical Section Sheets will detail the locations, widths and thickness of placement for the various pay items of Base and Subbase materials provided in the contract. The percentage of additives, such as cement or lime, will be specified on the Typical Section Sheet or along side the contract pay item. Appropriate blends of aggregates may be shown with the contract pay item, on the pit layout sheet or may be specified by Special Provision or by the Standard Specifications, as is the case for Crushed Aggregate Base (Section 825).

The Contract Pay Item will designate the Type Base or Subbase to be used, compacted thickness of the layer and the method of mixing (road, yard or plant). Prior to the placement of the first layer of Base or Subbase material, "Blue-Top" elevations should be set on the underlying subgrade or improved subgrade layer.

After the Base or Subbase has been compacted and "clipped" by the Contractor, the Engineer will be responsible for taking appropriate measurements for square yard payment computations. The length measurements are made by flat chaining or other approved method along the center of the layer placed. Unless widths in excess of the Grade Book specified widths are ordered by the Engineer, the widths of the layer shown in the Grade Book will be used for square yard computation. These widths are the top widths specified for the layer. The measurements taken should be recorded in a field book as to date taken, location, type and thickness of layer placed.

Inspection

The following check list is provided as an aid to the inspector:

1. Prior to placing the first layer of Base or Subbase, has the underlying subgrade or improved subgrade been checked to meet the string line and template requirements of Subarticle 230.03(e) and results noted in the Daily Inspector's Report? Does the underlying layer meet the density requirements of Section 306 immediately prior to placing the Base or Subbase layer?

2. Has the required thickness of Base or Subbase layers been changed from the original plan thicknesses as a result of pavement re-documentation? A copy of the re-documentation should be on file in the Project Office.

3. If pit sources are being provided by the Contractor, have these sources been approved in writing as to location, special erosion control or dressing requirements, etc.? Does the Contractor's request for approval contain an adequate erosion control plan? Has Historical, Archaeological and environmental clearances been approved? Does Contractor have storm water permit?

4. Are the Contractor's pit operations being performed in such manner that uniformity of material will be obtained throughout the project after processing? (Generally, excavating full depth of pit face and stockpiling in area of pit containing specification material, etc.) This is mainly for the Contractor's benefit since the material will not be tested until it is compacted on the roadbed.

5. If Base or Subbase is being Yard Mixed, is mixing being performed in such manner that foreign material is not being pulled into the mixture? Is adequate moisture being added such that the mixture at the point of delivery will be within (±) 2% of optimum? (It is suggested that at least one recorded moisture check be made per day of operation at the mixing yard.)

6. If Base or Subbase materials are being Plant Mixed, are all aggregates being stockpiled in accordance with Articles 106.05 and 801.11 of the Standard Specifications? Does the plant meet the requirements of Item 301.03(c)4 of the Specifications and has it been approved for use by the Project Engineer and Division Materials Section? Has the plant been satisfactorily calibrated by the Contractor to consistently produce a Base or Subbase material meeting specification requirements? If only aggregates are being blended by Plant Mixing, periodic checks of the calibration will mainly be the Contractor's responsibility since these types of Base or Subbase materials will be tested by the Engineer after they are in-place. However, if cement or lime is used as an additive during Plant Mixing, it will be necessary for the Engineer to make periodic checks of the calibration to determine that the plan specified percentage of these additives is being consistently introduced. These periodic calibration checks should be made any time the Plant Inspector notes irregularities in the cement or lime feed or non-uniformity in the mixture. The percent cement or lime being introduced should also be validated daily by the Plant Inspector maintaining daily records of the pounds of cement or lime used and the number of cubic yards of Base of Subbase produced by the Plant. These checks should be maintained in a field book.

Whether the materials being blended are aggregates, cement or lime, it is important that the proper calibration of the plant be maintained in order to obtain a consistent, uniform and high quality Base or Subbase material throughout the project.)

7. Are aggregates being used in Road, Yard or Plant Mixed Bases or subbases required to meet Section 801 of the Standard Specifications? If so, are loads from commercial sources accompanied by **Form BMT-I0**?

8. Are certified weigh tickets being furnished for materials that are to be paid for by weight, such as cement or lime? Is a certificate on file for the certified weigh master? Are weights legal?

9. If cement is shipped from an approved source, are copies of **Form BMT-114** on file? If pre-tested, but not from an approved source, are cement shipments accompanied by **Form BMT-114**? If not from an approved source or pre-tested, are samples being taken in accordance with frequency of ALDOT Testing Manual? Has lime been pre-tested? If not, are samples being taken in accordance with frequency of? If source of water for cement or lime treated Base or Subbase is other than city supply, have water samples been taken in accordance with frequency of ALDOT Testing Manual?

10. If lime or cement is to be Road Mixed, does the spread rate conform to the percent specified in the plans or proposal? Pre-measuring the area to be treated and confining the required weight of cement or lime spread to this pre-measured area can make this check. The spread rate for each spread of lime or cement should be documented in a field book. The uniformity of the spread can be determined by spreading a layer of building paper ahead of the spreader and checking the weight and uniformity of the spread deposited on the paper. The uniformity check should be made at least once for each two days of operation and the results recorded in the Daily Inspector's Report. Uniformity checks should be run sometimes with the spreader bin or tank full and sometimes nearly empty to make sure the rate of application does not vary with the amount of load in the spreader tank.

11. Is the Contractor conducting his/her hauling operation in such manner that the finished section of the subgrade is not disturbed? For some subgrade materials, it will be necessary to construct hauling pads throughout the length of the project as outlined in Subarticle 230.03(f). Soft areas that develop during hauling must be removed and satisfactorily repaired.

12. If Base or Subbase Pits are optioned by the Department and it is a requirement of the option that the Department document the quantity of payment to the property owner, have cross sections of the pit area been taken?

13. If payment for the Base or Subbase layer is to be by the cubic yard, have measurements of the truck beds been made and recorded in a field book by truck number? Are haul tickets **(C-7-C)** and source validation tickets **(C-22-C)** being punched for each day's operation?

14. Are gradation tests being run after compaction in accordance with frequency of ALDOT Testing Manual? If samples and re-samples fail to meet gradation requirements, stabilization of the layer will be required. If the gradation requirement on which the sample fails is minimal and such that no deficiency in the roadway pavement structure will result, the Department may agree to accept the layer as constructed in lieu of stabilizing, provided an acceptable price reduction is offered by the Contractor.

15. Are Moisture-Density Standards (P.D.'s) and in-place densities being run in accordance with the frequency of ALDOT Testing Manual for the type Base or Subbase being constructed?

16. Is the thickness of the Base or Subbase layers being checked by coring in accordance with the frequency of the ALDOT Testing Manual? Depths are to be recorded in a field book. (See Subarticle 301.05(d) for tolerances.)

17. Have straightedge and template checks been made in accordance with Subarticle 301.05(b) prior to priming or covering with next layer? Statements such as, "Checked surface of Lower Subbase Layer (six inches thick) from Sta. 300 to Sta. 320 and noted minor high areas from Sta. 305 to Sta. 308. These were corrected immediately by the Contractor and go ahead was given for placing of next layer," should be made in the Daily Inspector's Report after making these checks.

18. Has the Contractor obtained pit releases from the property owners of State-Optioned pits?

19. Are all pits dressed and grassed to the satisfaction of the property owner and such that erosion will not cause damage to adjoining property or to the project itself?

2:2:B: Bases (Shoulder Construction)

Description of Work

Shoulder areas are now placed on most all newly constructed roadways in order to provide greater safety to the traveling public, to provide an area for the disabled vehicle and in the case of paved shoulders to provide a more maintenance free facility. Shoulders will vary in width depending upon the type route (county, secondary, primary or interstate) and may be paved or unpaved and grassed.

Base and Subbase materials used in the construction of shoulders is basically the same as the Base and Subbase materials used for the roadway. Paving materials will consist of Portland Cement Concrete, where the roadway is of concrete or a combination of Bituminous Concrete Base, Binder and/or Wearing Layer with surface treatment or scoring where roadway is of bituminous concrete. In some cases a double surface treatment will be used where the roadway is of bituminous concrete.

The shoulder design will be shown on the plan typical sections, and for special design shoulders the sequence of construction in relation to adjacent base layers will be shown in detail on the typical section. This feature must be checked out from the plans and thoroughly understood by all before base or subbase construction begins. Shoulders are of two general types: (1) the standard shoulder formed by extending the pavement layers over the entire roadbed width and (2) the special design shoulder constructed separately from the base and pavement layers of the roadway and designed for special drainage and load capacity.

The standard shoulder is of simple construction and consists merely of extending the roadway base and pavement layers entirely across the roadbed from front slope to front slope in one operation, using the same type material. The Inspector should keep in mind that compaction, thickness, slope, etc. are important on shoulders as at other points, and should see that the specifications are not relaxed just because the work is not in the travel lane. Building the shoulder along with the pavement layers has the advantage of providing good side support while compacting the layer and there is no problem of having to blade in material temporarily against the layer for support while the edge of the layer is being compacted, which is quite a problem with special design shoulders.

The special design shoulder is used generally on the higher type designs, such as Interstate and Primary Routes. The plans will show the sequence of construction and the composition of each shoulder layer, and the Inspector must study them closely so that he/she is completely sure of each step and what must be done in preparation for the next layer and also what must be done to avoid damage to the underlying layer. In some respects special design shoulder construction is more tedious and complicated than base or subbase roadway construction.

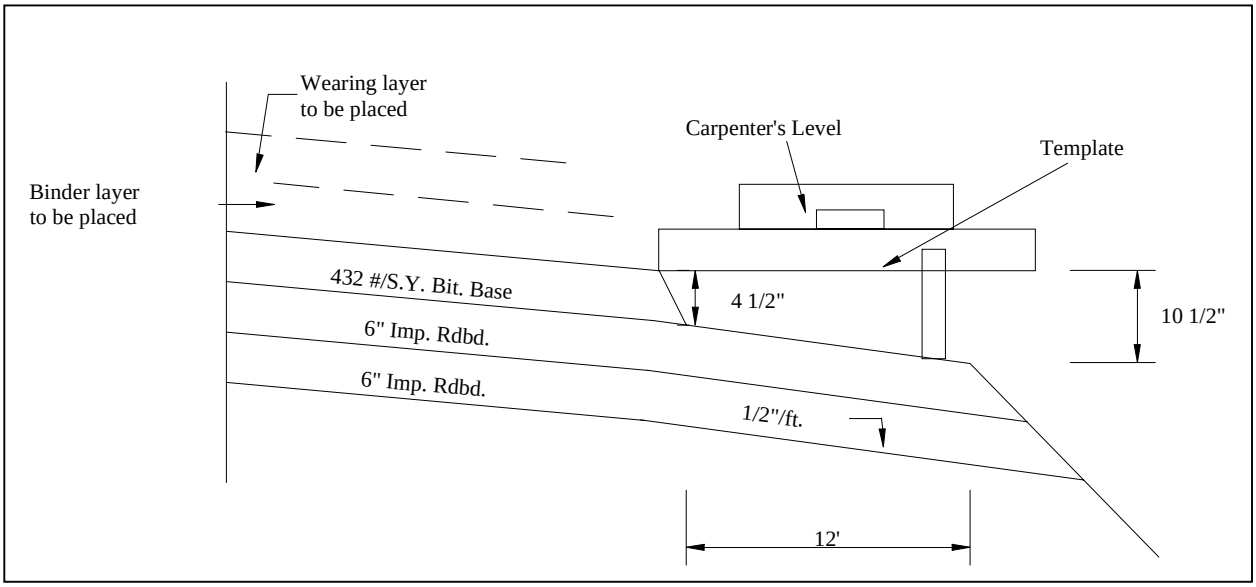
If a shoulder layer is made up of more than one component, it must generally be premixed, (Plant or Yard Mixed). It is obvious that such layers could not be Road Mixed without damaging the underlying layer or the edge of the adjacent base or subbase.

If a drainage system is required, it will generally be installed sub-surface adjacent to the Base and Subbase layers. Prior to its placement, the Soil and/or aggregate bases or subbases and possibly the majority of pavement layers will already have been placed on the roadway. The purpose of the underdrains is to provide a loose, coarse-grained material through which water from the base or subbase will readily drain into the side Ditch. The Department utilizes pipe outlets spaced at specified intervals to provide positive drainage from the underdrains.

All shoulder layers must be spread with suitable equipment and compacted to the percent density specified In Section 306. The plans will show usually that these layers are to be constructed of progressively higher type material toward the top. The general features of mixing, placing, compacting and finishing will be basically the same as previously described for roadway layers. The type of bituminous surface for the shoulders or the scoring of the shoulders will be shown on the plans. For protection of the edges of the pavement proper, as well as for safety, the shoulders should be completed as early as is practicable after placement of the bituminous pavement.

Engineering

The Plan Typical Section sheets will indicate the type materials to be used, the depth and width of the various layers of material and the slope to which the shoulder is to be constructed. The Paving Layout sheets will also indicate the shoulder widths and any width transition areas. The subgrade of the shoulder will have previously been graded to the "blue-top" elevations during the setting of roadway "blue-tops." However, prior to placing the first shoulder layer, the subgrade will usually require reshaping due to disturbance during the placement of roadway layers. The Contractor can perform the establishment of grades during this reshaping by utilizing Control Elevations that were established for use in constructing the Base and Paving layers. Another method of grade control during the reshaping of the shoulder subgrade consists of determining the required depth of the shoulder subgrade below the layer of roadway base or paving already constructed. A carpenter's level and template is then used by the Contractor to establish the outside shoulder subgrade elevation. The following sketch illustrates this method:



The above illustrated grade control method can also be utilized for subsequent layers of Base or Subbase.

After placement of each shoulder layer designated for payment by the square yard the Engineer will be responsible for measuring the linear feet constructed. These measurements should be recorded in a field book as to location, type and thickness of layer and date measurement is taken. Widths used in computing the square yards for payment will be the theoretical grade book width for the layer involved.

Inspection

The inspector should familiarize himself/herself with the sections on Bases and Subbases immediately preceding this section since most of the mixing, placing, compacting and testing procedures for the shoulder layers will be the same as for the roadway layers. The following additional guidelines are provided as an aid to the inspector:

1. Have in-place densities of the subgrade been re-checked immediately prior to placing the first shoulder layer on Special Design Shoulders?

2. Are shipments of any required commercial aggregates accompanied by **Form BMT-10**? If not, are samples for gradation being taken in accordance with the frequency of ALDOT Testing Manual.

3. Are thickness measurements, standard densities and in-place densities being taken and recorded in accordance with the frequency of ALDOT Testing Manual for Section 301?

4. Are straight edge and template checks being made and results noted in the Daily Inspector's Report?

5. Is spreading and compaction equipment such that no damage results to the underlying shoulder layer or layers being placed?

2:3 SURFACING AND PAVEMENTS

2:3:A "Surface Treatments"

Description of Work

Prime

Until the base has been constructed as specified in Section 301 and the surface smoothness tolerances listed therein have been met, priming should not be permitted. Also if ruts or potholes have occurred after smoothness has been checked, they must be eliminated before priming. The Contractor should never be permitted to run a motor patrol over the base and fill potholes or ruts with loose material preparatory to priming. This is sure to result in a rough, uneven surface under traffic. Usually the only remedy for such condition is to scarify, reshape, and re-compact. However, isolated potholes may be filled with aggregate, asphalt applied by hand hose, and the mixture thoroughly compacted to the required level. The smoothness of a surface treatment depends directly on the smoothness of the base, whereas with a plant mix surface, potholes can be filled with plant mix and tamped in advance with reasonable success.

The prime is a protective bituminous coating for the finished base layer. It provides the base surface with a sort of seal, which will help protect it until the next layer of material can be placed. For this reason it should be applied as soon as practicable after the base is in condition and has been accepted for priming. The prime also disposes of the remaining dust that can not be entirely removed in the cleaning process and thus provides a tighter contact between the bituminous surface application and the soil type base. The prime also seals necessary moisture in the base until cured, especially where the base has been cement treated. If the base is dry, sprinkling should be required before the prime is applied. Prime is regarded as a part of the surfacing operation, even though for the reasons stated above; it may be applied some time in advance of the other surfacing operations. In some sections of the State it is to the Contractor's advantage to prime a finished base to carry it through winter weather, even though he/she may later have to rework and prime some sections again just ahead of surfacing work, at his/her own expense.

Surface Treatments

Surface Treatments are presently being used for several purposes:

(1) To serve as the actual roadway wearing layer (normally confined to county or secondary projects), (2) As a layer in the pavement structure buildup that is to be covered with a Bituminous Plant Mix wearing layer, (3) As a sealer of cracks in an existing roadway surface prior to the placement of Bituminous Plant Mix leveling and overlay, (4) As the top layer of shoulder material providing delineation between the roadway and shoulder surfaces.

Surface treatment work is a fast-moving operation and requires correct timing of the sequence of steps. Therefore, all needed equipment must be on the site and in good working order before the work starts. Equipment used in surface treatment work will consist of a power broom, an asphalt distributor, self-propelled chip spreader, dump trucks and self-propelled pneumatic tired rollers.

Prior to the application of the liquid asphalt, the surface that is to receive the surface treatment must be cleaned of all material as noted in Subarticle 401.03(c). The Contractor will generally employ the use of a power broom, either self-propelled or pull type, hand brooms and/or hand shovels.

The asphalt distributor used in surface treatment work must be capable of accurately covering a given area up to 26 feet in width with a layer of asphalt at the specified rate indicated in Subarticle 40l.0l(b). Generally, two contractor personnel will operate the distributor and these personnel will consist of a driver and a "distributor operator" riding the back of the distributor directly above the spray bars. Both of these persons must be well experienced in their job in order to obtain asphalt "shots" that continuously meet the specification rate.

The distributor will be loaded with hot asphalt from a central storage tank or from a transport tanker parked at the project site. The hot gallons contained in the distributor tank after loading will be indicated by a dial gauge at the back of the tank or can be determined from a measuring stick with calibrated chart furnished for the distributor by the Contractor. A shielded thermometer will be provided in the side of the distributor tank for checking the temperature to which the asphalt is being heated and the temperature of the hot asphalt at the time the shot is made. The asphalt distributor will contain burners capable of raising the asphalt to the desired temperature immediately prior to shooting.

As the asphalt is discharged through the spray bars at the back of the distributor, the "distributor operator" as well as the State inspector will observe the discharge from the spray bars to insure uniform coverage of the treated area. If any streaked areas develop, the distributor should be stopped immediately and the area corrected with the use of the hand hose or by re-shooting with the spray bars. As the distributor moves along the surface, the distributor driver has the responsibility of maintaining the specified rate of asphalt discharge and constant rate of speed.

Prior to beginning the asphalt shot, sufficient truckloads of covering aggregate should be on hand for covering the full length of the shot. The chip spreader should begin placing aggregate immediately after the distributor begins his/her shot. The chip spreader is a self-contained unit capable of distributing aggregate to the roadway surface through metered gates. The mechanical spreader will be capable of placing varying widths by cutting off or opening the metering gates across the width of the front hopper. Aggregate for placement is received into a hopper at the back of the spreader with the dumping vehicle discharging into this hopper while attached to the chip spreader in reverse position. Any areas that are not completely covered with one layer of aggregate will require hand spotting. Hand spotting should be necessary for only minor areas and is usually accomplished with the use of hand shovels.

Immediately after spreading the aggregate, the rolling operation should begin in order to embed the aggregate while the bituminous material is still soft and tacky. Pneumatic-tired rollers must be operated at a speed slow enough to prevent the tires from displacing or picking up the aggregate. The ground contact pressure may be adjusted by adjusting the amount of ballast on the roller and/or adjusting the tire pressures. The rolling operation should begin at the outside edge of the surface and progress toward the center. Each pass of the pneumatic roller should overlap the preceding pass by at least one-half roller width. Just ahead of the rolling operation, the Contractor may wish to use a light drag broom to aid in uniformly distributing loose aggregate over the entire treated surface.

Usually there will be some loose aggregate particles on a new surface after the rolling operation has been completed. This loose aggregate should be swept off the roadway preferably during the cooler part of the day utilizing light sweeping with a power broom. Loose aggregate will tend to cause the loosening of additional aggregate and damage to automobile paints and windshields when under traffic.

If a double surface treatment is required, the second layer should be applied in the same manner as outlined above.

Transverse joints in surface treatments should be carefully made so that they will not be rough and unsightly. This can be successfully accomplished by starting and stopping each application of

bituminous material and cover aggregate on building or heavy wrapping paper. Each successive application should overlap the end of the preceding one by approximately one-half of an inch in order to avoid a gap in the surface.

Although a surface treatment is not classed as a high type pavement, it requires more skill of operation and more good judgment by the Engineer than some of the higher types. As in other lines of work there is no substitution for experience and judgment in surface treatment work and the Project Engineer and his/her inspectors, through close observation and contacts with more experienced personnel, should strive to improve judgment with experience. The ideal surface treatment layer is one where the entire surface is covered with embedded aggregate with no bare spot of bitumen showing and no aggregate particle lying on top of another.

Engineering and Inspection

The Contract Pay Item and Typical Section Sheets will indicate the type of bituminous treatment that is to be placed. The Typical Section Sheets will also indicate the location and width of placement for the surface treatment. Normally a prime layer, Type A treatment, will be placed approximately six inches wider on each side of the succeeding layers of treatment to be placed.

The type bituminous material to be used in the surface treatment work will sometimes be specified in the contract pay item and/or on the Typical Section Sheet. If not specified, the Contractor may select one of the Kinds, if not in conflict with other provisions of the specifications, permitted by the table under Subarticle 401.01(b). The size of aggregate, rate of aggregate spread and rate of asphalt distribution will be as shown in Subarticle 401.0l(b), unless otherwise modified by Special Provision or plan notes.

Once the top layer of soil or aggregate type base has been completed, the alignment control for the prime shot will be established. This control usually consists of nails and bottle tops along the edge of the proposed "prime line" at a maximum of 100 foot spacing. The Contractor will then install a string line along the bottle tops to be used as a guide by the distributor driver during the asphalt shot.

After the asphalt shot has been completed, the Engineer will be responsible for measuring the completed shot. Longitudinal measurements will be flat chained along the centerline of the shot. If only a prime layer is placed, the width measurement will be taken to the edge of the prime. If the prime layer is to be covered by succeeding aggregate treatments, the width of the type treatment will be to the edge of the aggregate and no additional payment will be made for the six inches of prime on each side. The length and width measurements should be recorded in a field book by: (1) date of measurement (2) station to station measured and (3) width of the asphalt shot. These measurements will be utilized by office personnel in computing the square yard pay quantity.

The following check list is provided as an aid to the inspector in the inspection of surface treatment work:

(1) Has the existing surface been cleaned of all loose material, dust, dirt and other foreign material prior to applying liquid asphalt?

(2) Does the underlying base layer meet all straightedge, depth and density requirements of Section 301?

(3) Is the supplier of the liquid asphalt listed on the Department's QPL? Is each shipment accompanied by Certificate of Compliance, **BMT-146**? If not, are job control samples being taken on each shipment?

(4) Is aggregate stockpiled in accordance with Articles 106.05 and 801.11? If from an approved commercial source operating under the Quality Assurance Program, are loads accompanied by **Form BMT-10**?

(5) Does the string line placed by the Contractor conform to the desired alignment?

(6) Has the Contractor made acceptable provisions for the protection of the traveling public? Has traffic control items been checked by the Traffic Control Inspector? Has in-place structures such as curbs, curb and gutter, bridge railing, etc. been protected?

(7) Is the proper grade of liquid asphalt being used and has it been heated to the desired temperature as outlined in Subarticle 40l.02(a) and Item 401.03(d)2?

(8) Is the liquid asphalt being applied both uniformly and at the proper rate, discharge uniform from all nozzles, driven at uniform speed on a straight course with guide string, building paper in place at beginning of run, volume of liquid asphalt measured before and after to determine amount used and are skips being promptly remedied by use of hand hose? The following example is given of computations for computing rate per square yard of asphalt at 60º F:

Conversion factors:

0.00035 per degree F. for petroleum oils having a specific gravity (60/60F.) above 0.966

0.00040 per degree F. for petroleum oils having a specific gravity
(60/60F) between 0.850 and 0.966

0.00025 per degree F. for emulsified asphalts.

0.00035 per degree F. for tars

Assume:

Hot gallons used = 600
Specific gravity = 0.90
Temperature = 300ºF
Square yards covered = 1808

Solution:

(300-60) X 0.00040 x 600 = 57.6 gallons
600- 57.6 = 542.4 gallons at 60º degrees F
Rate/Sq. Yd. = 542.4 / 1808 = 0.30 gallons

(9) Is the distributor tank approximately level at the time of determining the quantity of hot gallons on hand before and after shooting?

(10) Is cover aggregate on the site ready for spreading immediately behind the hot application?

(11) Is rolling equipment adequate in number and ready to start embedment of the aggregate immediately behind the spreader?

(12) Is hand or other satisfactory sweeping and spreading arrangement ready on the site to cover any bare spots immediately ahead of rolling?

(13) Is the rate of aggregate cover in accordance with Bituminous Treatment Table contained in Subarticle 401.01(b)? The inspector should count the number of measured truckloads of aggregate required to cover a given asphalt shot. Measurements of the truck beds should be recorded in a field book. The rates shown in the Treatment Table are loose measurements and are approximate only. The Contractor should be required to furnish sufficient aggregate to provide uniform coverage of the entire treated area.

(14) Is **Form BMT-36** being completed for each shot on each day of operation?

(15) Is the Contractor maintaining the finished surface promptly and adequately sweeping off surplus aggregate and repairing or covering bare spots as soon as they occur?

(16) Is Asphalt Price Adjustments being determined?

2:3:B Surfacing and Pavements (Plant Mixes)

Description of Work

Hot Mixed Asphalt Concrete plant mix (HMA) is a mixture of fine and coarse mineral aggregate and liquid asphalt binder heated and mixed in a central-mix plant. Aggregates used in plant mixes consist of crushed stone, gravel, slag, sand, and mineral filler. The central plant mix method permits removal of almost all moisture content, and close control of temperature and mixture composition resulting in a completed product of high uniformity. Hot Mixed Asphalt Concrete may be used on all types of roads and streets and when constructed properly will serve satisfactorily under the heaviest traffic. Heavy traffic applications may require polymer or other additives to be mixed with the liquid asphalt and fibers mixed with the aggregates. HMA may be used as a base layer, leveling layer, binder layer, surface layer or wearing surface placed on most any type of properly prepared surface.

Mix Design

The contractor will take available aggregates, Reclaimed Asphalt Pavement (RAP), and liquid asphalt binder and blend them to meet the specified mix. The contractor submits the completed mix design to the Bureau of Materials and Tests where the Bituminous section reviews the Job Mix Formula (JMF) for specification compliance. The JMF is then approved by the HMA Engineer or the Bituminous Engineer and returned to the contractor.

Plant Operations

Although asphalt plant operations will basically be controlled by the contractor's Quality Control Manager with the advice of the Division Quality Assurance Manager, Project field personnel should be aware of the principle functions of the plant since certain irregularities in plant functions can seriously affect the plant mix "lay down" operations on the road. Plant irregularities in such areas as moisture removal and uniformity of the mix (in both gradation and temperature) can cause difficulty in obtaining a smooth riding surface and may result in early deterioration of the plant mix layer.

Batch Plants

It is very important that complete separation of each of the materials be maintained in the stockpile and at the cold aggregate bins and feeders, if the benefits of aggregate control are to be realized. If the coarse and fine aggregates intermingle in the stockpiles, cold bins, or over the tunnel or feeder trap, control of the cold aggregate gradation will be lost.

A reasonably accurate calibration of the rate of feed of each of the cold aggregate feeders should be made so that the proper proportion of each size fraction will be fed into the plant. Although proportioning of the aggregates in the mix is actually accomplished from the hot aggregate bins, the cold aggregates must be fed in the same proportion, if a smooth balanced operation is to be achieved.

After passing from the cold bins through the cold feeders onto a belt or elevator the aggregates are fed into the dryer. In this unit the aggregates are heated to the required temperature, and moisture is removed from the materials. The fuel used to fire the dryer is usually natural gas, liquid propane gas or less frequently fuel oil. Fuel oil is atomized and oxidized at the burner nozzle by steam or low pressure air, and the flame and hot gases are drawn through the length of the dryer drum by the exhaust fan. The aggregates are heated and dried as they pass through the drum, entering at the exhaust end and traveling toward the burner end of the dryer. The dryer drum is set on a slope so that the aggregates

will travel rather slowly down the length of the drum as it revolves. Flights, or lifting troughs, are attached to the inside of the drum to lift the aggregates from the bottom of the revolving drum and spill them in a thin curtain through the hot gases.

It is important that these flights be in good condition. If the troughs are warped, bent, or missing entirely, the efficiency of the dryer is seriously impaired.

As mentioned before, the exhaust fan creates a draft through the dryer to remove the moisture vapor as the material is heated. The exhaust gases and vapor, along with the quantity of the very fine portions of the aggregate are discharged through the dust collector, or cyclone, where most of the dust is reclaimed and reintroduced into the mixing plant through an auger. Means should be provided at the auger to waste a portion of the reclaimed fines, if required to maintain gradation limits.

The temperature of the dried materials is measured at the discharge chute of the dryer by a pyrometer or thermometer. This heat indicator is necessary to maintain control of the temperature of the heated aggregates. Variations in temperature of the material will affect the quality of mixing, and overheated aggregates will result in excessive hardening of the thin asphalt coating during the mixing operation. The accuracy of the pyrometer or thermometer should be checked periodically against results obtained with a thermometer of known accuracy.

The dryer has been, in many cases, the most important unit in the plant setup. That was because the total output of the plant depended on how fast the material could be dried and heated to proper temperature. If the capacity of the dryer was less than that of other plant units, this slowed down total production. This condition has been recognized and dryer design is being improved to increase capacity. The dryer, therefore, should receive close inspection, both before starting and after being put into actual use. Our specifications require continuous movement of the plant mix spreader at the project site. If the plant has to slow down or stop to permit the hot bins to fill up, the Contractor must remedy the situation at once in order to maintain this continuous movement. Such irregularity causes a poor surface when the trucks do not arrive on the road and unload with uninterrupted continuity. The Contractor, if he/she so elects, can run material through the dryer to drive off moisture at times when the mixer is not operating, and then run the dry material through again at a faster rate during mixer operation. Thus the Inspector must keep check on the pyrometer to insure proper uniform heat, and on the hot bins to insure adequate output. If slag is being received on the job while still hot from the blast furnace heat, this may affect the dryer temperature, and the Inspector must watch out for overheating. Fine materials hold more moisture than coarse, and a surge of wet sand through the cold feed can overtax the dryer and lower the temperature. On the other hand more time is required to drive all the moisture out of larger sizes; the surface of the coarse aggregate may be dry and hot while at the same time moisture is retained in the interior of the particles. This moisture later will come out and condense, thus giving trouble. Speed through the dryer therefore must be slow enough to eliminate this condition. Usually, the plant fireman will try to correct this condition by increasing the amount of fuel fed to the burner. This can be done satisfactorily until incomplete combustion of the fuel occurs. A reduction in the amount of cold aggregate fed to the dryer will usually correct the situation and allow proper heating and drying of the material.

The heated aggregates are elevated to a screening unit, which separates the material into the required number of size fractions and deposits the various sizes into separate compartments. The screens must be clean and unbroken to function properly. A plugged screen cloth will result in carryover of fine material into the coarse aggregate bins, and control of gradation will be lost. During the preliminary inspection of the plant the Inspector should note the sizes and condition of the screens. Also during the course of operations, trouble that develops in the mix can often be traced to clogged or torn screens.

Therefore, they must be examined periodically to insure that they are functioning properly.

From the hot bins the aggregates are next combined in the proper proportions and mixed with the proper proportion of asphalt. There are two methods of proportioning, (1) batch method, and (2) continuous mix method. Currently, there are no continuous mix plants being used for state work in Alabama.

With batch-type mixing plants, the separate sizes of aggregates and the asphalt cement are proportioned by weight before mixing. The weighing scales must be checked for accuracy before beginning production and should be rechecked periodically during the life of the job. Test weights are required and kept on the job for this purpose. If any question develops concerning accuracy and adjustment of the scales, the Contractor must have them checked and adjusted by a competent commercial scale testing service, or calibrated with a State-certified scale.

The scales may be either a multiple-beam type (separate beam for each bin) or a spring less dial type. The weigh box is suspended from the scales, over the Pug Mill, and the proper weight from each bin, beginning, for example, with No. 1, is dumped one at the time into the weigh box. The dial scale will have pointers at the proper points to show the cumulative weights of the proper proportion from each bin. Multiple beam scales will be used in the same manner. Now, even though the scales are accurate, and the pointers on the dial or the poises on the beams are set exactly at the proper points, in operation of the bin gate levers by hand there is a tendency to overshoot the correct weight. Then if the asphalt weight is correct, the result is a lean mix. In extreme cases this could cause pavement failure. When truck weights consistently exceed the sum of batch weights, this situation likely is the cause and must be corrected.

The Inspector must periodically check the batching and mixing operations, making sure that the proper batch weights are being obtained, and that the aggregate hopper and asphalt weigh bucket are completely emptied into the Pug Mill after weighing each batch. If one bin tends to overflow and another run empty, some operators are prone to try to correct this situation by drawing more material from the overflowing bin and less from the bin that is running low. This practice must not be allowed, and the Inspector should be very firm in insisting that the correct batch weights be measured. Any batch or truckload should be rejected without hesitation whenever the Inspector finds irregularities in the weighing of aggregates or bitumen. Close contact between the plant Inspector and road Inspector should help in detecting such irregularities.

The Inspector should be especially watchful to see that the asphalt scale is correctly adjusted from time to time during the day to compensate for accumulation of asphalt and other matter on its sides. A small error in the bitumen weight in each batch can result in serious loss of bitumen.

Automatic controls are now rapidly supplementing or replacing the manually operated batch controls. One type of automatic control is arranged so that the timing and proportioning devices are all controlled by the single operation of a switch or starter for one complete batch cycle. Another automatic operation arrangement is as follows:

The automatic process control in conjunction with the timing unit will automatically dump preset weights of the materials into the Pug Mill or mixer in proper time sequences.

In case one of the materials is low in supply, the entire process will automatically wait until all the supply requirements have been filled.

After all the materials have been dumped into the mixer, the mixer cannot be emptied until the end of the preset mixing time.

It will not be possible to introduce mix ingredients to mixing hopper while the dump gate is open.

The materials to be mixed will automatically be weighed in preset proportions.

The bitumen and the aggregate weighing processes will be controlled by separate sets of components contained within the automatic unit, but it will be capable of performing both processes simultaneously.

This type of automatic control is very good. Another type will shut down the whole operation if there is an interruption in the bituminous feed. There is also an automatic control at the dryer that adjusts the oil or gas feed to increase or reduce the heat to produce an even flow of material at the specified heat.

In many automatically controlled batch plants, an automatic weight printer that prints the weights of aggregate, bitumen and total batch weight as components are introduced will be utilized. The automatic printer thus eliminates the need of separate weighing on the truck scales.

The Pug Mill or mixer is located directly below the weigh box, and the batch components, proportioned either by manual or automatic controls, are then dumped into the mixer. Frequent inspections of the condition of the mixture leaving the plant should be made, noting the consistency of the mix, the distribution of asphalt and aggregate throughout the mixture, and the temperature of the mixture. If the quality of the mixture varies from batch to batch, an immediate check should be made to locate the source of trouble. Uniform distribution of the asphalt throughout the mix is extremely important. If portions of each batch vary from rich to lean, the Inspector should look for uneven distribution of the asphalt across the mixer as it is introduced. It may be necessary to increase the mixing time to correct this situation. By examining the mixture in bright light, the experienced Inspector can quickly detect non-Uniformity in the mixture.

The Inspector must make periodic checks of the temperature of the aggregates and the asphalt, as well as the mixture produced. Generally the temperature should be as low as will permit moisture removal, good mixing, and proper spreading and compacting. It will be noted from Item 410.02(b)2 that the temperature at which the mixture must be delivered to the spreader will be specified in writing and that the mixture must be within 30 degrees of this specified temperature. The plant Inspector must insist that the temperature be kept as uniform as possible, as well as within required limits. At this point it might be well to remind the Inspector that truck beds may not be oiled with any petroleum based release agent to prevent the mixture sticking. Asphalt truck bed release agents that have been approved by Materials & Tests may be used on the truck bed.

Drum Plants

A drum mix plant has two major differences from a batch plant. First, the gradation is controlled by the rate of flow from the cold feed bins, not by a screening deck. Second, the aggregate is mixed with the liquid asphalt binder in the drum, not in a pugmill.

A drum mix plant is composed of cold feed bins, a cold feed elevator, automatic weighing systems, liquid asphalt binder storage tank and pumps, a drum mixer, a dust collector (baghouse or wet washer), a hot elevator, and an HMA storage (surge) silo. Most HMA plants have five cold feed bins. The cold feed bins have slanted sides and usually have a vibrator attached. Typically an adjustable gate and a variable speed feeder (connected to the weighing system) are used to attain the JMF gradation. The

cold feed elevator brings the aggregates to the drum mixer. An automatic weighing system on this conveyor continually weighs the aggregate and moisture entering the drum mixer. The moisture correction is made by determining the moisture content of the aggregate (in the stockpiles or on the conveyor) and programming this information into the automatic weighing system. The automatic weighing system corrects the total weight for the moisture so that the asphalt proportioning system can pump the proper amount of liquid asphalt binder into the drum mixer.

Some drum mixers are parallel flow, where the aggregate moves through the drum the same direction as the exhaust gases. Some drum mixers are counterflow designs, where the aggregate moves through the drum in the opposite direction as the exhaust gases. The liquid asphalt binder is pumped into the drum mixer about 2/3 down the drum length from the burner, just after the RAP (if any) has been added. When baghouse fines, mineral filler, or fiber are added to the mix, they are introduced in close proximity to the liquid asphalt binder. This is so they will be captured by the asphalt cement and not removed by the dust collector. Exhaust gases from the plant are passed through a dust collection system so that the plant shall meet emission requirements. The coated and mixed HMA is then conveyed to a surge or storage silo for loading into transport vehicles. A batch plant does not require a storage or surge silo, as the trucks may be loaded from the pugmill.

After plant mix has been mixed and discharged into the hauling vehicle, It must be weighed on a truck scale for documentation of pay quantities. For a batch type plant, weights that are documented with the automatic weight printer will not require weighing on the truck scales. Our Specifications now require the truck scales to be equipped with a digital recorder that eliminates hand printing of weights by the scale operator. A State Inspector will observe the weighing operation and sign the weight ticket as part of the double validation procedure for plant mix weights.

Road Operations

It should be emphasized that close contact between the plant and road inspectors must be maintained. Some defects in the mix that cannot be seen at the plant will show up when the load is on the road behind the spreader. The road Inspector must get word promptly to the plant Inspector so that corrections can be made before a lot of poor quality material is on the road. Close contact is also necessary on routine matters, of course, such as starting time, last load out temporary shutdowns, any mix-up in sending out and taking up load weight tickets, etc.

Just prior to placement of the pavement, an inspection of the base or old surface upon which the pavement is to be placed should be made, noting all soft or weak areas, small depressions or potholes and any area which require cleaning or extensive leveling. The Contractor must be required to remove and repair all soft areas, and to clean and prepare any existing surface to be paved or resurfaced. The requirement for a firm and unyielding base is of utmost importance, as the successful performance of a bituminous pavement depends greatly on the stability of the foundation**. The Inspector must never allow the Contractor to cover a soft or failing base layer** regardless of the Claims of the Contractor that the base layer has already been previously accepted.

The Contractor will generally employ the use of a power broom in the cleaning of a previously primed base layer. Existing paved surfaces may require the clipping of grass from the pavement edges as well as the use of hand shovels and brooms for removing caked dirt and other foreign material.

After the surface that is to receive the plant mix has been cleaned of all foreign material, it should be properly tacked if required by the Engineer. In general, a tack coat should be used over bituminous plant mix bases, old surfaces and between other layers of plant mix, when some time elapses between placement. Tack coat, if applied, will usually be at a low application rate on a freshly constructed

surface treatment, on a freshly primed base, on freshly uncontaminated plant mix surfaces, layers or patches.

The Department is presently using Liquid Asphalt Binder , PG 58-22, PG 64-22, PG 67-22 or PG 76-22 or Emulsified Asphalt, Grade CRS-2, CRS-2h, CSS-1, CSS-1h, CQS-1h, or CQS-1hp for tack material. The Contractor will generally lightly spray the surface through the use of the distributor bars or use the hand hose of his/her asphalt distributor to "fog" the tack coat over the surface. Surfaces, such as the curbs, gutters and existing pavements, against which fresh plant mix is to be placed, should also be painted with tack material to aid in bonding and sealing of the joint. Tack is usually applied to these type surfaces with a hand paintbrush. Emulsified tack material must be allowed to "break" prior to covering with plant mix.

Tack coat should not be applied too far in advance of the paving operation, normally not in excess of one day's operation. If the surface being covered is under heavy traffic, an additional application of tack may be necessary before the end of the day. However, considerable judgement is necessary in not applying excessive tack such that bleeding through the overlying layer will result. Equipment used in the actual laying of the bituminous plant mix will usually consist of an asphalt spreader, rollers for compaction, and tandem dump trucks. Certain specific requirements for this equipment are given in Subarticle 410.03(a) but basically it is the responsibility of the Contractor to furnish equipment that will produce, deliver, spread and compact the plant mixed material to the specified density, thickness and smoothness requirements.

Prior to spreading the roadway plant mix layer, any required leveling of the existing surface should be performed. The Contractor should be given as much advance notice as is possible of the intent to place a leveling course, so that he/she can plan his/her operations in an efficient manner. In some instances, the most satisfactory leveling results are obtained by spreading the mix with a motor patrol due to the longer wheel base of the patrol as compared to the asphalt spreader. Provisions for the use of the motor patrol will be covered by Special Provision. Smooth tires must be used on the patrol when this method of leveling is allowed. For thin layers of leveling material, adjustments in the bituminous plant mix gradation can be made as allowed by Item 4I0.03(c)3. Patching and leveling must, in all cases, be done ahead of, and separately from the spreading of the pavement layer. Patches and leveled areas must be thoroughly compacted prior to placing the overlying plant mix layer of uniform thickness. This is necessary since compacting of the extra depth leveling or patching material concurrently with the overlying uniform layer will result in a more compactive decrease in thickness of the leveled or patched areas and consequently a rough riding surface.

Prior to beginning each day of operation of bituminous paving, the Contractor and Inspector should check the asphalt spreader for proper cross slope adjustment. The Inspector must see that guidelines are set for the day's work, that the underlying surface is properly prepared and that the tack coat has been applied through the area to be paved within the first few hours.

In the construction of bituminous plant mix pavements, it is extremely important that the spreader be in good adjustment and that the machine and screed operators be experienced and capable. Item 4I0.03(a)4 requires that asphalt spreaders be equipped with automatic grade and slope controls. These automatic controls normally operate from a ski of not less than 30 feet in length riding on the underlying surface. Thus little adjustment should be required of the "screed man" during proper operation of the spreader and automatic controls.

Some spreader operators like to operate the spreader at speeds in excess of that required to handle the quantity being produced at the plant, and then stop until the next load arrives. This must not be allowed. Subitem 410.03(f)2a requires that the asphalt spreader be operated at a speed as uniform and

continuous as practical. In some cases this will mean that the spreader must operate at speeds of 9 or 11 feet per minute. This is a rather slow rate of speed but generally the slower the spreader is operated, the smoother the finished surface will be. The ideal speed of the spreader will be that which will result in a smooth, continuous process with no waiting period between trucks. Waiting between trucks is a cause of both gradation segregation (when the wings on the spreader are closed) and temperature segregation (the mix on the road cools faster than the mix in a hauling vehicle).

The Inspector should periodically check for difficulties while dumping loads of mixture into the hopper of the spreader. Trucks must not be allowed to back into the spreader in such manner that they bump it, nor should trucks which bear against any part of the machine other than the pushing rollers be permitted to dump. Any mix spilled onto the pavement in front of the spreader must be shoveled into the hopper or back into the truck before moving ahead with the spreader. The Inspector should be especially watchful to see that mixture spilled in the paths of the tracks or wheels of the spreader is removed before the spreader reaches it.

During the spreading of the plant mix, periodic checks should be made by the Engineer with the use of an engineer's level and level rod or with the string line and ruler to determine that the plan specified cross slope is maintained. It is the Contractor's responsibility to place the specified average weight per square yard of plant mix. The Engineer should emphasize to the contractor the need to make every effort to place the specified rate and to avoid placing material on either the low side or high side of the allowable tolerances. If it becomes obvious that the contractor is attempting to place material at the extremities of the tolerances, written instructions concerning the desired placement rates should be given.

It is the contractor's responsibility to assure himself/herself that he/she is placing the required amount as shown on the typical section unless the amount is changed in writing. Any changes to the amount specified in the plans should be covered in writing to the contractor.

The specified rate is calculated from the design strengths required and it is obvious that should the contractor consistently place material in each layer at the lower extremity of the tolerance, the desired strength will not be maintained.

Following the spreading of the bituminous plant mix to the required thickness and specified poundage per square yard, the rolling of the plant mix will be performed. Compaction rolling should begin while the mix is still at the highest temperature that will allow rolling to begin without damage to the plant mix surface. All compaction rolling should be completed prior to the mix cooling below a temperature of 180° F. Where vibratory rollers are to be used, lift thickness and roller and pave speeds should be taken into consideration when selecting the roller. The vibrating frequency should be high (above 2000 vpm preferable) in order for the impacts to not exceed one inch longitudinal increments. To determine the proper roller speed to provide a one-inch impact spacing, divide the frequency by 12. Thus a roller with a frequency of 2400 vpm should have a maximum operating speed of 200 ft./min. The frequency vibration is controlled by engine speed, not roller speed. Amplitude should increase with lift thickness to provide proper density; however, the use of too high an Amplitude will cause the roller to bounce and produce a rough surface. The total applied force required to obtain density on high type mixes with a minimum number of passes should normally be between 325 and 400 pounds per inch of roller width. The total applied force is the sum of the dynamic force and the static weight force. For most rollers the static force is 125 or 250 pounds/inch and the dynamic force 200 to 400 pounds/inch. Extreme caution is urged when rollers are operated in the dynamic mode while compacting thin layers.

The pneumatic-tired roller should begin compacting the mixture as soon as the mixture cools sufficiently to prevent picking up of the mix on the tires. If the mix has high stability, the roller should be operated with ground contact pressures in the range of 50 to 80 psi. In general, the roller should be operated with tire pressures as high as practicable without rutting, shoving, or otherwise displacing the mixture.

Before compaction begins, the outside edge of the spread material should be tamped, generally with a lute, to an approximate 1:1 slope. This firms up the edge and the slight ridge permits the full weight of the roller to bear to the extreme edge with less tendency to shove the edge out of shape.

Roller wheels must be kept moistened by mats fastened to the wipers on each wheel, without using an excessive amount of water, which might harm the surface of the pavement. Considerable judgement must be used in the timing of compaction, taking into consideration the temperature of the mix, characteristics of the mix, thickness and weather conditions. Under certain circumstances, rolling may be completed an hour after the mix is laid, while during the hottest part of the season for thick layers some hours may elapse before the pavement is in condition for the finish rolling. The roller drive wheel should be nearest the paver.

During periods of hot weather for the thick layers a delay in initial rolling may be necessary to prevent "hair-checking" of the mat or to avoid picking up of the mix on the wheels of the roller. The Contractor and Inspector must be very observant to begin the rolling of plant mix layers as soon as possible with the desired level of compaction effort to avoid any delays in achieving the specified density. Density tests should be performed on the completed layer as soon as practical after placement so that correction of deficient areas can begin immediately.

On each trip the roller should move straight into the fresh mixture and return straight back beginning at the edge and moving to the center. The roller wheel should not be angled over the next overlap until the roller is back on the compacted, cooled pavement. This method will produce a smoother surface. When not actually compacting the pavement, rollers should not be allowed to stand on the partially compressed surface. The Inspector should require that they be moved off the warm surface until further rolling is required.

In order to establish a minimum required rolling pattern or number of passes for the various types of rollers being used in the compaction train to obtain specified density, the Contractor and Engineer may perform a test strip for comparison of density results to number of passes, etc. during the rolling by each roller. The test strip will not necessarily guarantee that density will always be obtained but will give guidance to the Contractor and Engineer of the minimum effort necessary to approach required density. With the modern density devices now available, this type test strip can be easily accomplished.

Surface smoothness and density are both accomplished by rolling; therefore the testing for smoothness and density must begin before rolling is completed and while the mixture is still warm enough to be manipulated. Straight edging by contractor personnel with observation by the State Inspector should be kept up behind the initial rolling. Smoothness deficiencies such as short choppy waves should be corrected immediately, usually by cross rolling.

Clipping of high spots with a motor patrol has been allowed on plant mix layers below the wearing layer, but is usually not very successful and hopefully can be avoided with expeditious straightedge checking of the warm plant mix.

The construction of transverse joints at the beginning of each day's operation and after breakdowns is probably one of the most crucial steps in obtaining a smooth riding surface. At the completion of the

day's operation, the contractor will normally place heavy wrapping paper on the underlying surface across the joint and place plant mix on top of the paper. The paper between the two surfaces will facilitate the expeditious removal of the plant mix joint at the beginning of the next day of operation.

Regardless of the temporary means used in the forming of the joint at the end of the day, Item 410.03(h)3 of the Standard Specifications requires that a vertical" joint "be constructed in the previously laid material by cutting prior to beginning the days operation.

In moving off of the vertical transverse joint, some contractors will utilize a board of the desired thickness placed across the top of the previously "laid material. When the spreader screed is let down on the board and moves ahead, the fresh plant mix will be at the desired level above the previously laid mix such that when it is rolled a smooth joint will be formed. The spreader should proceed only a short distance ahead of the joint, and not proceed at full speed until hand finishing of the joint is completed. The Contractor should be required to check this work closely, using the straightedge to see that the requirement for surface smoothness is met across the "joint". When hand raking is performed on a joint, all segregated coarse aggregate should be removed and discarded, to avoid a coarse, porous surface at the joint.

Particular attention must be given to the construction of the longitudinal joint when paving adjacent to a cold, previously laid lane. The Inspector must insist that hand raking be held to a minimum, by adjusting the screed so that the freshly laid pavement is of the proper depth, allowing for compaction, to meet the grade of the previously laid lane. The non-compacted mixture immediately adjacent to the joint should be left slightly high so that the roller can compact the mixture thoroughly at this point. The individuals raking must not be allowed to cast excess mixture over the non-compacted, freshly spread lane. All segregated course particles of mix remaining after shaping the joint must be removed and wasted, to avoid construction of a coarse, porous joint.

If there is to be more than one bituminous plant mix layer the longitudinal joints should be staggered so that they will not be directly over each other. Thus, for a pavement on a binder layer on a base layer, the joint in the base layer should be at least six inches off center toward one side, the joint in the binder should be at least six inches off center toward the other side, and the joint in the wearing layer should be on the centerline as outlined in Item 4l0.03(h)2.

Engineering and Inspection

The Contractor is responsible for providing alignment control for each plant mix layer. This control usually consists of measurements that can be taken from the previously established "prime line" in order for the Contractor to set his/her guide string line.

The location, type and pounds per square yard of mix to be placed, width of each layer and cross slope will be indicated on the Plan Typical Section Sheets. In some cases, width transitions will be indicated on the Paving Layout Sheets. On projects that provide Base and Paving, as well as Grade and Drain in the same contract, the poundage per square yard may be changed from that shown on the Typical Section Sheet due to pavement re-documentation during the course of the project and the Engineer must be aware of these changes.

Asphalt Plant checkout and control will basically come under the direction of a Materials Engineer furnished by the Division Materials Section and will be under the supervision of the Division Materials Engineer. The plant mix material shall be measured by a qualified Weighmaster using acceptable mass tickets. As a minimum the mass ticket shall contain the name of the producer, name of Contractor,

Project Number and County, truck number, contract item number, date, gross weight, tareweight, net weight and Weighmaster signature. The remaining responsibilities of project personnel will be at the "lay-down" site and the following checklist is provided as a guide for the Inspectors in the performance of their duties:

(1) Is a copy of the approved plant checkout sheet as completed by the Division Materials Section on file? Is a copy of the job mix formula for the type material being placed on file? When component sources or quality changes is there an updated job mix formula on file?

(2) Is the supplier, which is shipping liquid asphalt to the plant, on the Department's MSDSAR? Is each shipment accompanied by Certificate of compliance**, BMT-146**? If not, are job control samples being taken on each shipment? Are Certificates of Compliance, **BMT-146**, on file for the tack material being used or are job control samples being taken.

(3) Are weigh tickets for commercial aggregates stamped with **BMT-10**? Is weigh ticket for aggregates delivered to project that are being paid for by weight signed by a qualified Weighmaster and is it being validated with the signature of the project field inspector?

(4) Are copies of the asphalt plant inspector's daily extraction tests**, Form BMT-20** on file?

(5) Is each truck load of plant mix delivered to the project accompanied with appropriate weight ticket signed by a qualified Weighmaster and is it being validated with the signature of the project field inspector?

(6) Is the temperature of the mix being checked periodically at the point of delivery and recorded on the weight ticket? Is temperature within specified delivery range? (Suggest at least five checks per day and more frequently if temperatures are not uniform. A small hole should be provided in the side of each truck bed to accommodate the Inspector's Thermometer.)

(7) Is the underlying surface properly prepared, tack material in good shape and guide string in-place prior to spreading plant mix? Are edges not confined by curbing or other structures being tamped and shaped immediately behind the placement operation?

(8) Is the asphalt spreader maintaining a continuous forward movement by coordination of speed of spreader movement with plant production?

(9) Is the rate of spread being appropriately checked periodically? Suggest a minimum of five checks per day utilizing a taped distance for a load of plant mix. Rate of spread should be continuously checked with depth measurements. No recorded documentation of these checks will be required other than a statement in the Daily Inspector's Report that they are being made. **Form BMT-4** is to be completed for each 5000 square yard unit or day of operation and this form will serve as documentation of the average rate of plant mix placed.

An example of checking the rate of spread utilizing a taped distance is as follows:

Assume:

Lbs. of Plant Mix on truck =40,000
Width of spread = 12 ft.
Rate per sq. yd. = 300 #/sy.

Solution:

$$\frac{(L)\,(12)}{9} \times 300 \text{ \#/sy} = 40{,}000 \text{ lbs.}$$

$$L = \frac{40{,}000 \times 9}{3600} = \frac{40{,}000}{400} = 100$$

L = 100 feet (This measurement to be made ahead of spreading the truckload of plant mix. If truck does not go the pre-measured distance, rate is too heavy or if it goes beyond the 100 feet, rate is too light.)

(10) Tack records will be documented on **Form BMT-4**. It will also be necessary to record individual shots in a field book set up as follows:

Sta.	Sta.	Hot Gals. Before	Hot Gals. After	Hot Gals. Used	Gals. @ 60ºF	Sq. Yds.	Rate

(11) Is the Contractor using good workmanship in the construction of transverse joints to obtain a smooth riding joint?

(12) Is the Contractor beginning his/her straight edging operation immediately after initial rolling and continuously correcting deficiencies behind the placement of the fresh mix? An Inspector must be present during the straight edging and mark all areas for correction that are not within the tolerances of Article 410.05. A comment should be made in the Daily Inspector's report concerning the general areas requiring correction and how the correction procedures are progressing. During the placement of the fresh plant mix, the Engineer should also periodically check the cross section of the pavement with the use of a template, engineer's level and/or string line.

(13) Is the plant Inspector submitting information on the mixture's maximum theoretical density?

(14) Are cores being cut or nuclear gauge density checks being taken as soon as practical (While mat is still warm) after placement so that any necessary corrective measures can begin immediately? Have nuclear gages been calibrated for the layer being placed?

(15) Have trucks, used for hauling, been checked to verify compliance with specifications? Are truck bodies being treated with an approved release agent?

TROUBLE SHOOTING GUIDE FOR PLANT MIX PAVEMENTS

CAUSES

PROBLEM	Fluctuating Head of Material	Feeder Screws Overloaded	Finisher Speed Too Fast	Too much Lead Crown in Screed	Too Little Lead Crown in Screed	Overcorrecting Thickness Control Screws	Excessive Play in Screed Mechanical Connections	Screed Riding on Lift Cylinders	Screed Plates Worn Out or Warped	Moldboard on Strikeoff Too Low	Cold Screed	Screed Plates Not Tight	Feeder Gates Set Incorrectly	Running Hopper Empty Between Loads	Kicker Screws Worn Out or Mounted Incorrectly	Incorrect Nulling of Screed	Screed Extensions Installed Incorrectly	Screed Starting Blocks Too Short	Vibrators Running Too Slow	Grade Control Mounted Incorrectly	Grade Control Hunting (Sensitivity Too High)	Grade Control Wand Bouncing on Reference	Grade Reference Inadequate	Sitting Long Period Between Loads	Improper Joint Overlap	Improper Mat Thickness for Max. Agg. Size	Trucks Bumping Finisher	Truck Holding Brakes	Improper Base Preparation	Improper Rolling Operation	Reversing or Turning Too Fast of Rollers	Parking Roller on Hot Mat	Improper Mix Design (Aggregate)	Improper Mix Design (Asphalt)	Mix Segregation	Moisture in Mix	Variation of Mix Temperature	Cold Mix Tempatures
Wavy Surface - Short Waves(Ripples)	0	0	0				0	0		0										0	0	0	0						X	X			X	X	X		X	
Wavy Surface - Long Waves	0					0	0	0					0	0						0			0	0			X	X	X		X	X			X		X	
Tearing of Mat - Full Width			0						0		0															X						X	X	X	X	X	X	X
Tearing of Mat-Center Streaks					0				0		0			0	0																							X
Tearing of Mat-Outside Streaks				0					0		0	0		0				0																				X
Mat Texture-Non-uniform	0	0	0					0	0	0	0		0					0	0					0		X			X				X	X	X		X	X
Screed Marks							0																				X	X										
Screed Not Responding to Correction			0				0	0		0										0						X											X	X
Auger Shadows		0																															X	X	X			
Poor Pre-Compaction			0					0											0							X			X									X
Poor Longitudinal Joint	0	0				0		0												0	0	0			0					X								X
Poor Transverse Joint		0					0	0		0						0	0													X								X
Transverse Cracking (Checking)																													X	X			X	X		X	X	
Mat Shoving Under Roller																													X	X	X		X	X		X	X	
Bleeding or Fat Spots in Mat																																	X	X		X	X	
Roller Marks																													X	X	X	X					X	
Poor Mix Compaction																													X	X	X	X	X	X		X	X	X

Zeros (0) indicate causes related to the paver.

X's indicate other problems to be investigated.

NOTE: Many times a problem can be caused by more than one item, therefore, it is important that each cause listed is eliminated to assure the problem is solved.

2:3:C Surfacing and Pavements (Portland Cement Concrete Pavement)

Description of Work

The construction of concrete pavement is a highly mechanized operation, which requires inspection of a vast quantity of materials and a working knowledge of numerous types of equipment. ALDOT Concrete Technicians assigned to this work should be thoroughly familiar with the Specifications, Special Provisions, construction details, and sequence of operations.

Pavement concrete will be a mixture of coarse aggregate, (usually two sizes), fine aggregate, fly ash, cement, air entraining additive, retarders or reducers if specified, and water. The pavement may be plain or reinforced. Reinforcement may be bar mats, wire mesh, or continuous reinforcement. Forms may be required, or the slip-form method may be permitted. All these details will be specified on the plans or in the project proposal, and it is the responsibility of the Project Engineer and ALDOT Concrete Technicians to study these details to the extent that they will know, beyond question, exactly what is required.

Job Mix

The Project Engineer will be furnished a job mix design for use by the Batch Plant. The central laboratory will work out this formula. After the Contractor has designated the sources and types of materials he/she proposes to use, and after these have been accepted as satisfactory, the Materials and Test Bureau will make tests in the laboratory. Trial mixes may be required on materials for which the Department has no prior records. From these trial mixes or laboratory tests the actual job mix will be determined. The job mix proportions will usually vary slightly from those shown in the Master Proportion Table of Subarticle 450.02(c) since these proportions are dependent on the characteristics of the materials to be used by the Contractor. The cement factor will be as shown in the Master Proportion Table.

The job mix will include a number of additives. Fly ash will be included in the amount shown in the table. One of a number of approved air entraining agents will be required, sufficient to produce three to five percent entrained air. The suggested dosage for the agent needed per batch, will be specified by the laboratory. This entrained air makes the mix more plastic and workable, and makes the finished concrete more frost resistant. There are also additives that may be used as needed to retard the setting of concrete or reduce the water content, or to accelerate the setting process in extremely cold weather. The suggested dosage for any of these will be indicated in the job mix.

The Project Engineer must bear in mind that the Contractor cannot be required to use an additive not in his/her contract, unless supplemental agreement or other means pays him for it. However, there are cases where the Contractor, in order to facilitate his/her work, will be willing to use an approved additive without additional compensation, but this will require prior written permission from the Bureau of Materials and Tests and Construction Bureau.

Sampling and Inspection

The Project Engineer must make sure that tests have been made for all of the materials that are to be used in the work, and that the sources of these materials have been approved prior to shipment. Aggregate from approved sources will be stockpiled with **Form BMT-10** accompanying each shipment. After the aggregates are shipped and stockpiled, daily samples will be taken for gradation and fineness

modulus checks. The failing test reports should never be discarded, but should be filed for the record along with the passing reports, and entry made in the diary as to whether the material was rejected or re-tested and found acceptable.

The duty of taking field samples for check analysis is assigned to the ALDOT Concrete Technician. He/she should take samples in such a manner that they would be truly representative of the material sampled. The best point for sampling aggregates is usually the discharge gate of a bin or the conveyor belt. The samples should be taken daily and any time there is visual evidence of something wrong.

When sampling from a discharge gate, enough material should be run out so it is flowing in a steady full stream before the sample is taken. Then the sampling box (there is a special design sampling box with a handle that is convenient for this use) should be passed slowly through the discharge stream so that the entire width of the stream is caught in the box. When sampling from a conveyor belt, it should be stopped and all the material on a section of the belt removed as a sample. The method of sampling from a conveyor belt is described in AASHTO T-2. Generally, samples that are truly representative are hard to secure from stockpiles or Railroad cars. The method of sampling from stockpiles and Railroad cars is described in Note five of test procedure AASHTO T-2.

Tests for deleterious substances such as clay lumps, shale, chert, coal, lignite, soft particles, etc., will not need to be made often at the batch plant, because these tests were made at the source and the source would not have been accepted if objectionable. However, the ALDOT Concrete Technician should watch for evidence of these materials, and if they begin to occur in noticeable amounts, he/she should take samples for analysis, and send extra samples to the central laboratory. He/she should watch for accumulated coating of dust on the aggregate. Even thin coatings of dust, silt, or clay on the aggregate are harmful as they weaken the bond between the cement paste and the aggregate. If normal watering of the aggregate to keep it saturated does not remove this film, the aggregate should not be used in that condition and the Project Engineer may have to require that it be washed.

The moisture condition of the laboratory job mix aggregate is "saturated, surface-dry". This means that the interior of each aggregate particle contains all the moisture its structure will permit, while the surface of the particle is dry. To keep the interior of the aggregate particle saturated it is necessary in hot weather to water the stockpiles at intervals to replace the interior moisture lost by evaporation. The "surface-dry" condition cannot be obtained in the stockpiles, so it is necessary to run moisture tests on the aggregates at frequent intervals (3 or 4 times a day under adverse conditions) to find out how much surface moisture is going into the batch. Then the water to be added to the batch is reduced by that amount. Samples for these tests should be taken as the aggregate passes from the bin into the weighing hopper, and the tests should be run before the samples lose any more moisture.

Cement shipments are sealed if shipped in bulk and are accompanied by forms and documents, which indicate the type of cement and certifies the source. This information is usually contained on **Form BMT 114,** which should always accompany the shipment. The ALDOT Concrete Technician should pick up all copies of the form at the plant and complete the information requested in part two. After this portion has been filled out the forms are then sent through the Division Materials Section to be finally approved by the State Testing Engineer. The ALDOT Concrete Technician should always be present when the seal is broken and the shipment is pumped into the storage bin and his/her signature on the **BMT 114** should indicate that he/she was present when the seal was broken and the shipment unloaded. The cement may be used once the ALDOT Concrete Technician receives the **BMT 114** and sees that the shipment was properly sealed; however a copy of the **BMT 114** signed by the Testing Engineer covering the shipment will be forwarded later for the Project files. No cement should be

accepted for use unless the shipment has been properly identified as coming from an approved source. These approved sources should be on file in the project office and must be checked prior to accepting any shipment. Should it become necessary to test the cement prior to use, samples are shipped in cement cans furnished for that purpose to the Central Laboratory with information on brand of cement, source, date received, car or truck number, etc. If testing is done in this manner the shipment should not be used until notice is received that it is satisfactory. During the unloading operation the ALDOT Concrete Technician should be especially careful to see that no cement is being used to batch concrete when the cement temperature exceeds 150°F.

Aggregates must be stockpiled in conformity with Specification Articles 106.05 and 801.11. The ALDOT Concrete Technician must see that there is no segregation in handling from stockpile to bins and from bins to weigh hopper. A clamshell is preferable in filling the bins from the stockpile. If a front-end loader is used, it should load by taking a uniform slice up the side of the stockpile. It should not pick up from the toe of the stockpile, which causes segregation. Dropping aggregate from a considerable height will cause segregation, the coarser material rolling to the outside edges. Also in a high wind the fines will be blown to one side and some lost entirely. Therefore, the bucket should be as low over the bin as practicable when dumped. Bulkheads must be used to separate stockpiles of separate sizes unless piles are entirely separated, and materials must not be allowed to top the bulkhead. Where shipments can be made on short notice, the Contractor may save trouble by keeping his/her stockpiles within smaller limits.

Storage bins or buildings for cement and for fly ash must be so constructed that the material will be kept dry. Additives must be so stored as to avoid damage. The ALDOT Concrete Technician must see that all these storage facilities are adequate in size and otherwise satisfactory.

Equipment

Equipment plays an important role in concrete paving. The ALDOT Concrete Technician should familiarize himself/herself with the mechanical features of all machinery used on the project so that an intelligent appraisal of the condition and adjustment of each machine can be made. Handbooks of operation instructions are available from equipment manufacturers, which explain various adjustments and operating procedures.

In the event the manufacturer's instructions for an individual piece of equipment differ from the procedure outlined herein, comply with the manufacturer's instructions. All paving machinery should be correctly adjusted within the first 100 feet of operation. Examine each machine's performance carefully and require adjustments as soon as the need for such is indicated. Continued use of an unsatisfactory piece of equipment can only result in an excessive amount of corrective work. The ALDOT Concrete Technician should only point out unsatisfactory work and require the Contractor to make the necessary equipment or personnel adjustments to correct the situation.

Personnel from the Division Materials Section should assist Project personnel in a thorough inspection of batching, mixing, and hauling equipment of central plants.

Batching Equipment

Batching equipment requirements are covered in detail in Specification Subarticle 450.03(a). The ALDOT Concrete Technician should study this Subarticle until he/she is thoroughly familiar with every requirement. The batching setup will be basically the same whether the concrete is mixed in a central

plant, by transit mixers, or by traveling mixers at the pavement site. No matter which batching operation is used, the ALDOT Concrete Technician must have a working knowledge of how the plant operates. He/she must be familiar with the location of each bin and the scale which weighs each component.

Scales

Scales are probably the most important unit of the batching plant. They must be set level and supported on adequate foundations. They should be checked for level occasionally for the first several days of operation. The weigh beams and material hoppers must be protected from the wind. Usually enclosing on three sides will suffice. The bins should be fully loaded for 24 hours before calibration of the scales is started, to allow for settlement. The scales should be calibrated or checked for correctness before any concrete work is started. Accuracy should be checked at intervals of at least once each week thereafter, or more often if there is reason to believe anything is wrong. In directing the Contractor to check the accuracy, the ALDOT Concrete Technician should choose times when the plant is idle except when there is an obvious error. He/she should have an understanding with the Contractor at the beginning of the work that these periodic checks will be made, so that the Contractor may schedule them at times convenient to himself/herself and the ALDOT Concrete Technician. Also the scales should be checked for balance with no load, at least twice a day. If the beam does not balance or the dial pointer does not rest on zero with no load, something is wrong and must be corrected before the scales are used. The scales may need adjustment or there may be other trouble, such as material stuck in the hopper, etc.

For checking accuracy the ten 5O-pound weights are used and the Contractor must furnish personnel to do the work under the direction of the Project Engineer or ALDOT Concrete Technician. For the project records, the ALDOT Concrete Technician should keep a record of all accuracy checks in his/her diary or daily report. The cement scales should be checked first with no load and then in 5O-pound increments up to the maximum cement batch load. Use the same method for the fly ash scales. One set of scales may be used for cement and fly ash, provided a separate beam is used for each, or double pointers on dial scales. Aggregate scales should be checked first with no load and then in 500-pound increments. Use the ten-50-pound weights and correct the scales as needed by turning the adjusting screw. Then remove the weights without changing the scale setting, and carefully add aggregate until the beam balances. Then add the ten 50-pound weights and correct the scales for 1,000 pounds. Then repeat the process until a point approximately ten percent below the batch capacity is reached. Then proceed in 50-pound increments to a point approximately ten percent above the batch capacity. When adjusted thus, the scales will be accurate for weights near the batch capacity. The 50-pound weights should be placed so as to distribute the weight uniformly over the hopper.

Other additives may be weighed on suitable scales and added to the batch as directed when supplied in solid form. However, some of these will be supplied in solution and can be added to the batch by liquid measure, usually at the mixer. The ALDOT Concrete Technician must require that a satisfactory and reasonably accurate method of measuring be used. An air-entraining agent must be added to the batch separately. Use of Portland cement containing air-entraining agent is definitely prohibited.

Other Batching Equipment

Bins and hoppers should be examined before the work starts and periodically afterwards to make sure they comply in all respects with Specification Subitem 450.03(a)1b. The weigh hoppers should be examined frequently to see that the sides are smooth and that they empty completely for each batch with no material accumulating in the corners and failing to dump. Also, the operating procedure should be observed to see that the hoppers are not getting unnecessarily rough treatment that might jar the

scales out of balance. During loading operations the ALDOT Concrete Technician should make sure that the bins are not being over filled and material spilled from one bin into another.

The weigh hoppers for cement and fly ash must be equipped with an enclosed chute, boot, or other effective device for transferring the material from hopper to the cement or fly ash containers on the truck without loss from spillage or wind. The ALDOT Concrete Technician must see that the device is smooth, clean, and suitable for transferring the entire amount weighed without clogging. The cement and fly ash are usually fed from bin to weigh hopper by air pressure. A surge in air pressure can affect the amount being weighed by causing the scale beam or dial needle to register heavier than the actual weight. The ALDOT Concrete Technician must watch the air pressure to see that it is uniform and adequate to discharge the cement or fly ash, but not strong enough to affect the scales.

Mixers

Mixers may be either of three types, (1) a traveling mixer at the pavement site, (2) a stationary central mixing plant, or (3) a transit mixer. A description of each type mixing operation is as follows:

1. Mixers at site of Construction

On-site mixing is done with the mixer (sometimes called paver) traveling on the subgrade inside the forms, on the shoulder or on adjacent pavement outside the forms. The concrete is discharged directly onto the subgrade by means of a bucket traveling along a movable boom.

The Division Materials Section will check out the on-site mixer prior to beginning paving operations and the Project on-site Concrete Technician should be present during this check out. He/she should have available and should study the manufacturer's manual for the type of mixer involved. The water feed must be calibrated and examined for leaks in the same manner as on a central mixer. Skip and drum should be examined each morning before work starts to see that there is no accumulation of hard concrete and blades should be checked for wear occasionally and repaired or replaced if worn more than 3/4". The boom must be long enough to reach all areas of the slab. The bucket should close tightly to prevent leaking of mortar. When paving from adjacent slabs it may be advisable to require the Contractor to provide a satisfactory "drag" behind the mixer to catch the droppings. When operating from an existing concrete slab the skip should have old tire casings or other bedding fastened to the underside to cushion the impact when the skip is lowered.

When batch trucks are dumping into the mixer skip, the ALDOT Concrete Technician should see that batches are dumped completely without spillage outside the skip. Be especially watchful to see that materials from one compartment do not spill into adjoining compartments when the truck bed is hoisted. Check to see that portions of the batch do not hang up in the corners of the compartment. Variations in batch sizes will result in non-uniform consistency of the mix batches as well as wasted material.

Check to see that the skip is completely empty when in the fully raised position.

If an entraining agent is added at the mixer, checks must be made of the quantity added to each batch by the automatic dispenser. The automatic dispensers have been known to malfunction resulting in an excess of air entrainment in the mix or no air entrainment at all. For this reason, occasional checks should be made to see that the dispenser is functioning properly.

Occasionally, checks should be made of the mixing timer. Once the mixer timer is set and locked, it must not be changed except on order of the Engineer. Mixing time starts when the skip is empty, not when it is raised. On-site mixing is controlled by the time the concrete is mixed, not by the number of drum revolutions.

Trucks for hauling dry batches to the on-site mixer should be given a close inspection. Batch compartments must be of adequate size and dividers high enough so that material will not spill from one compartment to another while the truck bed is raised and dumping. Dividers and end gate must be tight enough to prevent flow of materials from one compartment to another or loss of material in transit. If necessary, a flexible gasket such as old belting or a hose may be fastened to the edge of dividers and end gate. Sides, bottoms, end gates and dividers must be metal. Where sideboards are used they may be wood lined with metal. Trucks must be equipped with separate water tight compartments for transporting bulk cement and fly ash from batching plant to mixer skip and these must be arranged to dump clean for each batch. Each morning the ALDOT Concrete Technician should examine each truck bed to see that all hardened concrete or other adhering material has been removed and the truck bed and dividers left smooth so as to empty quickly and completely when dumping. At the first inspection, any truck beds found badly bent or dented so as to interfere with free movement of the dividers or clean emptying of materials into the skip should be rejected and not allowed to haul. Trucks hauling over new or existing pavement or bridges must not be allowed to load more than the legal weight. Where trucks pass onto or off of existing pavement, pavement edges should be protected. Some methods of protection are heavy boards or timbers.

2. <u>Central Plant Mixers</u>

The central mixing plant may be one set up and operated by the Contractor, generally adjacent to his/her batching plant, or in rare cases, it may be a commercial plant sending it's total output to the project. The specifications require that all central mixers and concrete hauling equipment comply with the requirements of ALDOT-352 contained in the ALDOT Testing Manual. While paving operations are in progress, the central mixer shall serve only one project at a time.

For central plant mixing, the batching and mixing units are separately operated, but closely located. Materials are carried to the mixer by conveyor belts or batch trucks. Inspection of mixing, separate from batching inspection, is always necessary. Many features of mixing require close inspection in order that properly mixed concrete in correct proportions of components and of uniform consistency may be produced. Improper mixing or incorrect proportions will reduce strength and durability of concrete. Non-uniform consistency may affect strength, but in addition will nearly always result in a poor riding surface.

The Concrete Batcher must see that the batch is dumped without spillage outside the mixer and with no cement, fly ash, or aggregate hanging up in the corners of the batch compartment.

A correct water content is most important. Mixing near the batching field laboratory permits quick communication between technicians so that changing the proportions at the mixer can quickly compensate for variations in moisture content of aggregates. The alert Concrete Batcher can also, by visual inspection, detect variations in moisture that need correction in the quantity of water required to produce uniform consistency. Consistency is measured by the slump cone and must not exceed the specified slump of the job mix.

Some central mixers are equipped with a slump meter, which is very useful in maintaining uniform consistency. This is merely an instrument, which registers variation in the power needed to turn the mixer, calibrated by a slump test to show the variation in terms of slump. Low slump concrete requires more power for mixing than high slump concrete. On the other hand, variations in power may result

from variable voltage, variation in aggregates, thoroughness of mixing, etc., thus the slump meter is valuable only as a general guide. It must be supplemented by slump cone test at intervals as needed.

The Concrete Batcher must watch carefully the amount of air entraining agent added to see that the amount of air in the finished concrete is within required limits. Air in proper amounts improves the plastic concrete by reducing segregation, improving workability, reducing bleeding, and reducing water requirement somewhat. It also increases resistance of hardened concrete to freezing and thawing.

Air and slump tests will be made at the paving site. However, they may be made at the plant site when deemed necessary for better control.

Concrete from central mixers may be hauled in truck agitators, transit mixers operating at agitating speed, or in non-agitating truck bodies meeting the requirements of Subitems 450.03(a)2d and 450.03(a)2e of the Standard specifications. Any vehicle that cannot discharge without segregation should not be allowed to haul.

3. <u>Transit Mixers</u>

Mixing by truck or transit mixers will be permitted only when so specified on the plans or in the proposal.

The Division Materials Section will check all transit mixers, but the field ALDOT Concrete Technician should be familiar with certain basic requirements for transit mixers. The drum and mixer blades should be in good condition and blades not unduly worn. The drum and blades must be clean and free of caked concrete. This should be checked each morning before the truck is allowed to start. Number and revolutions per minute at mixing speed and at agitating speed must physically be counted for a check and must agree with those shown on the manufacturer's plate on the mixer. The water compartment must be arranged so that the proper amount of water can be measured into the mixing drum and no more added. This is important. Wash water must be carried in a separate compartment with separate controls. The drum capacity should be on the manufacturer's plate. The discharge should be checked to make sure it can discharge at the required rate. The automatic counter should be examined to make sure it is tamper-proof. There are two types of counters: One registers the number of revolutions regardless of speed. The other registers the number of revolutions at mixing speed as distinguished from agitating speed. Very few of the latter type are in use.

Mixing instructions are basically the same as for central mixers. For specific requirements, the ALDOT Concrete Technician should consult AASHTO M-157, which is listed in his/her ALDOT Testing Manual.

<u>Mechanical Spreader</u>

The spreader may be a paddle, screw, hopper or other type that will spread the mixture uniformly for the full width between forms. The spreader unit may include a strike off screed or the strike off may be a supplementary unit.

The concrete shall be spread in the process of being deposited on the underlying surface in such manner as to require as little re-handling as possible. Unless truck mixers, truck agitators, or non-agitating hauling equipment are equipped with means for discharging concrete without segregation of the material, the concrete shall be unloaded into a bucket or hopper from which it shall be discharged and then mechanically spread on the underlying surface in such manner as to prevent segregation of

the materials. However, the Contractor may be permitted, if requested in writing, to dump on a trial basis directly from the transporting vehicle onto the underlying surface through an approved spreader which will deposit the fresh concrete within the limits of the paving equipment's guides. Placing shall be continuous between transverse joints without the use of intermediate bulkheads. Any necessary hand spreading shall be done with shovels, not rakes. Workmen shall not be allowed to work in the freshly mixed concrete with boots or shoes coated with earth or foreign substances.

Vibrators

Vibrators must be used to consolidate and settle the concrete against the forms, points around reinforcement and throughout the mass of the concrete. The requirements and procedure in Subitem 450.03(a)3b are clear. The vibrators may be attached to the spreader or may be mounted as a separate unit. The ALDOT Concrete Technician should check the vibrator frequency from the plate on the vibrator or the Project Engineer should secure this data from the manufacturer. If the vibrator is allowed to remain in one location more than a few seconds a pool of mortar will collect around each spud and segregation will result. Therefore, the ALDOT Concrete Technician must watch the operator of the hand vibrator vibrating the concrete adjacent to the forms and caution the superintendent about this and the mounted vibrator assembly must be arranged so that the vibrator is cut off when the spreader or other vibrator carriage stops.

Finishing Machine

The transverse-finishing machine is the key unit in the finishing train. It must strike off and compact the mixture at the elevation and crown shown on the plans. To achieve this result, the ALDOT Concrete Technician should furnish the Contractor the proper ordinates to be set in the screed and should allow the Contractor to set the screed himself. The ALDOT Concrete Technician should only check the finished paving surface behind the finish machine to see that the Contractor has set the proper ordinates.

At super-elevated curves it is necessary to gradually take out the crown to a flat section and then gradually return the screed to the full crown. This also applies to the spreader strike off which should be adjusted at the same rate as the screed. The transition distance from crown section to flat section is shown on the plans. A survey party working with the ALDOT Concrete Technician should set stakes at regular intervals along the transition so that the crown can be taken out or restored in equal increments to make a uniform transition between crown and flat. The transverse finisher usually has a single adjustment control to run out the crown. An experienced operator should be furnished by the Contractor to "crank out" the crown and to restore it beyond the curve.

Longitudinal Float Machine

The longitudinal float machine is the last mechanical operation in the finishing. Its purpose is to erase the irregularities and the corrugations left by the transverse screed and leave a smooth surface finish. There are two types in general use. One is a straight (no crown) screed parallel to the pavement centerline moving across the pavement on a transverse track set to the crown of the pavement. The other type is a pan type arrangement that has a smoothing action. The pan type at present is used more than the oscillating straight screed. The pan float should normally be set almost flat in the direction to the road and should just make contact with the surface enough to do a smoothing job. Transversely, the pan is adjustable and must be adjusted to the exact crown of the pavement or preferably 1/16" to 1/8" high in the center to allow for settlement of the wet concrete. It may be a separate unit or mounted on the same frame behind the transverse screeds. It may have vibrators or they may be mounted separately.

Burlap Drag

The burlap drag finish comes next. This drag is described in Item 450.03(l)5 and the ALDOT Concrete Technician should see that it complies. Especially, it should be clean to avoid irregular marks left by mortar crust. If the Contractor will not see that it is washed clean after each use, the ALDOT Concrete Technician should require that it is discarded and a new one used. Frequent renewals will be necessary. The burlap drag should be used at the proper time, which is just as the surface begins to lose its watery sheen and turn dull. It may be necessary on this account to drag in small increments. If applied too soon, the drag marks will flow out and do no good. If too late, the concrete will be so hard the drag will not produce the required texture.

Tine Machine

Most concrete paving now requires a tine or grooved surface texture to reduce the hydroplaning effect. The tine finish is to be placed with mechanical equipment and follows the application of the burlap drag. Equipment consists of a tining board mounted on a frame extending across the width of the pavement being placed. The frame can be adjusted to the appropriate crown of the roadway and is mounted on tracks or wheels for forward movement. The tining board is aligned parallel to the roadway and as it is mechanically pulled across the surface the tines form transverse grooves in the pavement. The tine board is usually about eight feet in length but may be longer if the equipment can satisfactorily handle the length and produce the desired results.

Concrete Saws

The concrete saw generally has a circular blade, edged with diamonds or other abrasive and with water connections for cooling the blade. The rig may be mounted on rubber tires and guided across the pavement by hand, in which case the operator must have a guide mark on the pavement. Other types now in general use are mounted on a frame on wheels over the pavement. These generally are equipped for both transverse and longitudinal sawing, and being held to a true line by the frame is accurate without guide marks. With this type, all the transverse joints are generally sawed in order without skips.

Slip Form Paver

A slip form paver has the following general characteristics. The concrete is deposited into a hopper or directly on the underlying surface inside the slip forms, which extend somewhat ahead of the paver. Then follow in order the spreader with strike off, the vibrating machine, the transverse finisher and the longitudinal float all concentrated within the limits of the slip forms which are rigidly attached to the paver. These units are all part of the paver which moves forward on tracks on the underlying surface as the concrete is placed. After the paver and slip forms have passed, the only operations to be performed are the final straight edging and correcting humps and low spots, dressing edges of expansion joints, burlap drag and curing. Edging is sometimes done inside the slip forms and sometimes later. The front transverse screed on one type of paver is rigidly attached instead of oscillating like a conventional screed and is shaped to give the proper crown and elevation to the surface. The rear transverse screed or belt oscillates and smoothes the surface.

Construction Details (Fixed Forms)

1. Setting Forms

As usual, the first duty of the ALDOT Concrete Technician on form setting will be a thorough examination of the forms and pins. They must be in good condition and must meet requirements of Item 450.03(a)5. The ALDOT Concrete Technician should watch especially for bent forms or those with badly bent wedges, braces or locks. Any forms showing evidence of being bent should be checked, both the face and the top, with a straightedge and those not meeting specified requirements should be rejected and removed from the work or straightened and rechecked by the ALDOT Concrete Technician before use. The Project Engineer or ALDOT Concrete Technician should arrange for Contractor personnel to handle forms during inspection or, if inspection is deferred, until forms are placed. It should be understood that any defective units will be replaced promptly.

For short radius curves, 100' or less, a flexible steel band or form securely staked in place will be acceptable. Of course, the finishing equipment cannot operate on it. For short radius curves at street intersections a "hard form" or form shaped rigidly to the specified radius should be used especially where there are several of the same radius. These "hard forms" will possibly be easier for the Contractor to set and the grade around the curve can be checked more easily.

When forms are to be used, the foundation under the forms should be hard and true to grade so that the form, when set, will be firmly in contact for its entire length and at specified grade. Any grade, which at the form line is found below established grade shall be filled to grade with granular material in lifts of ½" or less for a distance of 12" on each side of the base of the form, moistened as required, and thoroughly compacted. If the nature of the underlying surface is such that a granular material cannot be used, as is the case with Bituminous Concrete Base, consideration may be given to the use of a different type material. Imperfections or variations above grade shall be corrected by tamping or by cutting as necessary. The Contractor shall provide suitable means, acceptable to the Engineer, for the fine grading of the strip on which the forms are to be placed.

Any low area under the form must be corrected by removing the form and then tamping in materials as outlined above. Seldom should an attempt be made to build up by forcing material under the form. It is a good idea to leave the tamped material a little high and then tamp the forms down to proper grade after replacing. If forms settle objectionably under the load of the paving equipment, operations should be stopped until the Contractor can satisfactorily correct the situation.

There is no length specified for the form pins. A shorter length will be adequate in firm material. In all cases pins must be long enough to penetrate a sufficient distance to hold the forms firmly in line. Movement of the forms under paving equipment calls for longer pins as one of the first steps toward correction.

Form settlement has become an increasing problem with the use of newer and heavier spreading and finishing equipment. The machinery vibration also adds to the problem. If forms continue to settle, compaction under forms should be watched closely and increased as needed. Form settlement should be watched especially for the first few days after beginning paving operations. To check for settlement drive heavy stakes about a foot outside the forms at two or three joints so that the top of the stake is exactly level with the form. After the finishing equipment has passed check with carpenter or engineer level. If the form seems to have settled and then recovered, check with a heavy finishing unit on the form. If the settlement will jeopardize the riding surface or will cause the surface to be out of surface tolerance, operations should be stopped and the situation corrected.

After each use, the form should be thoroughly cleaned of any caked concrete with special attention to the top where equipment wheels must roll. Forms must be oiled before each use.

Where there is likelihood of rain, the Contractor should be encouraged to cut drain holes under the forms ahead of the paving and extend the ditches out through the shoulders so that water cannot be trapped on the underlying surface. This precaution often will avoid a delay, waiting for the soft underlying surface to dry out.

When setting forms at ramp noses, variable widths, and transitions, the ALDOT Concrete Technician should give careful consideration to plan details so that crown lines may be properly set.

2. Preparation of the Underlying Surface

After forms are placed and checked, the underlying surface must be accurately shaped to proper grade and cross section with reference to the top of the forms. These corrections or fine grading shall be accomplished by equipment designed for this purpose and operated so that the specified cross section is obtained.

There is no satisfactory method of building up a low spot in cement treated subbase. It must be either torn out and replaced with cement treated subbase at the proper elevation or left in place and the low spot filled with concrete concurrently with the paving operation. This extra concrete must be taken into account in computing the distance that a given volume of concrete should pave. Low spots in other types of underlying surfaces, not containing cement or constructed of plant mix, can be brought up by scarifying and/or adding more of the same material, re-mixing and re-compacting to required density. The ALDOT Concrete Technician must see that all disturbed areas of the underlying surface from whatever cause are dressed and thoroughly re-compacted. For minor low areas the Contractor will probably prefer to increase the thickness of the pavement accordingly and this is permissible.

The template, Item 450.03(d)3, is the last check on the underlying surface before placing concrete. Normally a "scratch tooth" template is used for this purpose. The points of the teeth should be set to the exact crown of the bottom of the pavement and checked by the ALDOT Concrete Technician for correctness. The template carriage rides on the forms. If any high spot is indicated by the fine scratching, the surface must be planed and excess material properly disposed. It is desirable to check the underlying surface from a string line ahead of the scratch template about every 50', plus any intermediate point where the underlying surface appears to be high or low. This can be done by one ALDOT Concrete Technician hooking a line over the top of the form drawing it tight across to the top of the other form and fastening and then measuring down from the string at the center and two points on each side of the center where the crown ordinates have already been figured. High and low spots should be noted and called to the attention of the Contractor. Since the Contractor will generally choose to fill the low areas with concrete, they should be recorded by the ALDOT Concrete Technician in his/her report or diary just in case the Contractor raises the question that he/she was not getting proper yield. The ALDOT Concrete Technician should also record any high spots, which were then cut too low by the Contractor and will result in the placement of more concrete than originally called for.

Requirements for watering and sprinkling the underlying surface contained in Item 450.03(e)2 are clear and need no comment, except that this operation is essential to prevent a dry underlying surface from absorbing part of the water from the concrete mixture, which would weaken the concrete.

3. Setting of Dowel and Expansion Joint Assemblies and Tie Bars

Load transfer devices (dowel bars) are to be placed at points shown on the plans and shall meet the requirements of Item 450.03(j)7. Requirements will vary from project to project depending on the design and on the type of reinforcement. It is necessary, therefore, that the ALDOT Concrete Technician study

the plans and inform himself/herself on the types of dowel assemblies to be used and where they are to be placed for his/her particular project. The type of expansion joint and material for joint filler will vary from project to project, and at different points on the same project. Special joints are required at bridge ends. No dowels will be required on certain continuously reinforced pavements. In short, only by thorough study of the project plans will the ALDOT Concrete Technician be able to see to it that every joint and dowel assembly is properly installed at the proper location. The "assembly" will include the dowel bars and the basket or framework required to hold them in place, together with expansion material for expansion joints. The ALDOT Concrete Technician should check the assembly to see that it is at right angles to the roadway, and firmly staked or pinned in place so there will be no movement under the concrete, that the bars are parallel to the surface and to the centerline of the pavement, that there are no burrs on the ends of the dowel and that caps and stops are in place on one end of expansion joint dowels. Dowels that are not truly parallel may cause a "blow-up", cracking, or spallation at the joint. Dowel assemblies should be placed only after forms are set so the forms can be used as a check. If the trucks and mixer operate outside the forms, the assembly can be placed and checked some distance ahead of the mixer.

Tie bars or two-piece threaded "J" bolts across the longitudinal joint may be installed ahead of the paving by use of chairs or key-ways tack welded to the inside of the form to hold them rigidly in place at the proper elevation and at right angles to the joint so that they will not move when the concrete is deposited. The ALDOT Concrete Technician must see that they are properly spaced and at the correct height according to the plans. Another method of placing tie bars is by a mechanical arrangement that spaces them and forces them into the concrete to the proper depth. This is usually done behind the strike-off of the spreader and in front of the transverse-finishing machine. One fault with this method for which the ALDOT Concrete Technician must watch is that it occasionally skips a bar and often places bars out of proper position and line. When this begins to occur, the contractor should be required to substitute a satisfactory method promptly. Tie bars should not be painted or greased as their function is to tie the two halves of the slab together.

The ALDOT Concrete Technician should be certain that the cross-section of the expansion assembly is the same as the pavement cross section and that it is set perpendicular to the surface.

If the ALDOT Concrete Technician finds that the spacing of the contraction and expansion joints as specified on the plans will not work, the ALDOT Concrete Technician should contact the Project Engineer promptly.

4. Spreading of Concrete

The method of placing and spreading concrete, Subarticle 450.03(h), preparatory to screeding and finishing, will depend on whether the concrete is mixed on-site, in transit, or in a central mixer.

Placing of concrete on the subgrade from on-site mixers and from central mixing plants will to a large degree determine the smoothness of the riding surface. On large contracts, on-site mixers are usually operated outside the forms on both sides of the roadway being paved. It is most important that the mixer operators do not deposit too large a volume of concrete immediately ahead of the concrete spreader. This will cause an overload on the spreader and the effect of this is that the spreader will ride over this overload and leave too much concrete for the finishing machines to shove ahead. It is also important that the screeds on the concrete spreader, the concrete finishing machine, and the mechanical longitudinal float are coordinated and screeds adjusted so that the leading machine leaves the proper amount of concrete for each successive machine.

With on-site mixers, operating either inside the forms or from outside on one or both sides, there is little danger of segregation. The boom or booms must be long enough to reach all parts of the subbase. A good mixer operator will dump with the bucket as low as practicable and will spot the batches over the subbase so that a minimum of spreading by the mechanical spreader will be needed. However, the operator must be very careful not to bump the form with the open gate of the bucket as it returns. If this happens the ALDOT Concrete Technician should have the form line checked at once and straightened up, if needed, before work proceeds.

Transit mixed batches, or batches hauled from a central mixer in agitator or non-agitator type vehicles, should be handled as specified in Subarticle 450.03(h). One satisfactory type of spreader moves on the forms and has a hopper or bucket moving on a transverse track across the spreader ahead of the strike- off. The load is dumped from the hauling vehicle into the hopper and then the hopper moves across the subbase, opening the gates and spreading the concrete transversely as it proceeds. Some arrangement of this type is a requirement for ready-mixed concrete. Another arrangement is a reversible paddle or plow set at an angle and moving across the subbase on a frame spreading the batch as it moves. Another spreader uses a worm or screw arrangement for spreading. It is the ALDOT Concrete Technician's responsibility to see that the load is spread without segregation, and it is the Contractor's responsibility to select equipment that will do it.

5. <u>Placing Reinforcement</u>

The type, spacing and other reinforcement details will be shown on the plans. It will vary from project to project and at different locations on the same project. The Project Engineer and ALDOT Concrete Technician must, therefore, make a study of the plans to find the special requirements of their particular project. A wider variety of types and methods are in use today and these are being constantly improved and changed. Only by thorough study of the plans can the inspecting personnel be qualified to see that the construction work complies fully with plan requirements.

Bar mats, steel fabric and in most cases wire mesh will require placement of the concrete in two layers. With written approval of the Engineer, the Contractor may, by using a satisfactory mechanical mesh placer, embed the wire mesh reinforcement in the concrete placed full depth in one layer, in lieu of the two layer method. Approval of this method will be on a trial basis and subject to continued satisfactory operation of the mesh placing equipment. These two methods of steel placement are described as follows:

<u>Two Layer Construction</u>

Concrete is placed in the forms, spread, struck-off by the spreader, and vibrated. The strike-off bar of the spreader operates inside the forms and at such elevation that the surface of the concrete after vibration is at the proper level to support the steel in the position shown on the plans. A length must be finished at least long enough to place one mat. The bar, wire mesh, or steel fabric mat is then lifted in place and laid on top of the concrete layer. The ALDOT Concrete Technician must check and make sure that it is the proper distance from each form, that it is lapped in the manner and for the distance shown on the plans or is spaced the proper distance from a joint. He/she must see that it lies flat on the concrete with no objectionable twist or bends. Then the concrete is poured up to the top of the forms, spread, screeded and finished. It will be noted that the time elapsed between the first and second layers can not exceed 15 minutes. Normally one mixer and spreader-vibrator will handle the first layer, followed by another mixer and complete paving train on the second layer.

Mechanical Mesh Embedment

This method can not be used except with written approval of the Engineer and then only on a trial basis subject to continued satisfactory performance. In this method the concrete is placed, spread, and struck-off by the spreader at the level of the finished pavement. The sheet of wire mesh is fed onto the surface by the installing machine, which then presses it into the fresh concrete the proper distance by means of a system of spuds or feet. The wire mesh sheet should be pressed into exact position with reference to side forms, depth, joints, and correct lap. The ALDOT Concrete Technician must check all these points. At first there probably will be representatives from the Montgomery and Division Offices present on any project where this method is tried, and the Contractor should be required to have available a copy of the manufacturer's operating and adjusting manual of instruction. After the wire mesh is properly embedded, the transverse finishing machine and other operations will follow.

If Continuously Reinforced Concrete is used the steel must be placed as follows:

In this method the longitudinal and transverse reinforcement is placed ahead of the concrete, supported on the underlying surface by chairs or other supports, and securely fastened in place at the correct depth below the surface as required by the plans. Then the concrete is placed and finished in one layer full depth.

The details of placement of the reinforcement are rather complicated. Constant reference to the plans will be required to check all the details for which the ALDOT Concrete Technician is responsible.

The chairs or supports for the reinforcement must be one of the types shown on the plans, or if another type is proposed, the ALDOT Concrete Technician must make sure it has been previously approved by the Engineer. In no case will concrete blocks or similar supports be allowed. Any type used must have a broad enough bearing on the underlying surface so that it will not give under the impact of the batch of concrete when dumped. The ALDOT Concrete Technician should check behind the spreader several times a day to make sure the supports have not sunk into the underlying layer and let the reinforcement mat down below the depth from the pavement surface shown on the plans.

At the beginning and end of the continuously reinforced section and at bridges, there is special construction, which the ALDOT Concrete Technician can check thoroughly only by having the plan sheets in hand.

The pattern of the longitudinal bar laps should be noted and checked until the work is well started. Spacing of steel should be checked to make sure spacing is correct. The only dowel bar assemblies needed will be installed at the expansion joints. Special extra bars are required at construction joints.

After reinforcement is in place and checked, the concrete pavement slab is then poured in one layer and finished.

6. Finishing Concrete

The ALDOT Concrete Technician must observe closely the operation of the transverse finisher for it reveals many faults. If excessive free water shows behind the screeds, the mixture is coming too wet and the concrete batcher should be contacted promptly. If the screed rides over without cutting, the batch was too dry, the screed is tilted too much or possibly the machine is too light. If the screed leaves excessive corrugations or if the surface tends to tear under the screed, it may be that the number of transverse strokes of the screed per foot of advance should be increased. If there is excessive

movement of the forms under action of the machine, the ALDOT Concrete Technician should be cautioned to require more care in setting forms ahead. If the roll ahead of the screed is lost, instead of remaining about the same height, concrete must be brought back from the batch and spread over the low area and the screed machine must back up and make another pass. If the rear screed loses its roll or the roll increases, the front screed needs adjusting. The ALDOT Concrete Technician must not allow mortar or concrete spilled over the edge of the form to be used to rebuild the roll. If the screed continues to lose the roll, perhaps the spreader strike-off blade should be raised slightly. The screed machine wheels must never be allowed to ride over concrete or other materials spilled on top of the form. The machine has a scraper attachment to clean the form ahead of the wheel and the ALDOT Concrete Technician should check occasionally to see that it is working properly.

Two complete passes of both front and rear screeds over each area generally will be required to produce a smooth floated surface with plenty of mortar at the top and true to grade and crown. All areas should have the number of passes required to produce a uniform surface throughout. It must be remembered that the work of the transverse finishing machine includes the cutting off of any high spots and filling of any low areas, leaving the surface true to crown. The longitudinal finisher or float, which follows, should not have to do any cutting or filling, but merely smooth out the surface. Therefore, the transverse screeds must not be allowed to leave any irregularity uncorrected, even if extra passes of the machine are necessary.

If the transverse screeds have done their work properly, there is no work for the longitudinal float or pan except to smooth out screed marks and dress the surface so that only a minimum of hand dressing will be needed. The ideal objective would be for the float to eliminate all hand dressing, which, however, is hardly ever achieved. If the float shows high spots that the transverse screed missed, they must be scraped off. If low areas show up they must be filled with more fresh concrete, not mortar wasted outside the forms. The float must make as many passes as necessary to smooth the surface out and bring it to grade: Usually about three passes over the surface will be necessary under good conditions. The ALDOT Concrete Technician must see that tops of forms are clean and that wheels of the float carriage bear on the forms at all times without riding over high spots in the pavement.

The longitudinal float or pan should operate as far behind the transverse finisher as practical, if mounted as a separate unit, in order to allow time for water to rise and the concrete to subside or settle. Especially in cool weather the float should be held back, but not to the extent of delaying subsequent operations too long.

Where the road is on a substantial grade or where the pavement is super-elevated, the ALDOT Concrete Technician must be especially watchful and the finishing crew must be especially careful in their work. The wet concrete will tend to move or flow downhill, particularly while being vibrated and screeded. This condition is aggravated when it is necessary to pave in a downhill direction. Only by close attention, careful finishing, and constant checking until the mass is stable and hard, can a smooth, true surface be obtained in such locations. When widening on a super-elevated curve, the last lane poured should be on the upper side so that the flow will be toward the previous pour. A low side pour will tend to separate. Likewise it is preferable to proceed upgrade with the paving where practical. In these locations a few batches with a slump over 1 1/2" can ruin the surface.

Immediately following the longitudinal float, the Contractor should make a preliminary straightedge check of the surface. The ALDOT Concrete Technician should watch carefully the straight-edging of the surface and see that it is thoroughly done as specified in Item 450.03(l)4. He/she should be especially careful at each transverse joint because roughness is more likely at that point. He/she should be on the spot to see that any remaining high spots are scraped off and low spots filled with concrete as they show

up under the straightedge. Normally a ten-foot float is used to dress the surface and float a mortar film to the surface. "The Bull Float" should be used only when necessary. Excessive use tends to rub high and low spots into the surface.

The burlap drag finish comes next. The burlap drag is described in Item 450.03(l)5 and the ALDOT Concrete Technician should see that it complies with this Item. The burlap drag should be used just at the proper time, which is just as the surface begins to lose its watery sheen and turn dull. It may be necessary on this account to drag in small increments. If applied too soon, the drag marks will flow out and do no good; if too late, the concrete will be so hard the drag will leave no marks.

After the application of the burlap texture has been completed, the surface will be transversely grooved with the mechanical tine machine. Edging will follow the tine machine. The ALDOT Concrete Technician should check the plans to see that the radius of the edger is as required. The work person should not tilt the face of the edger down away from the form or press it into the concrete so as to mark the soft surface. A rounded edge with the handle of the edger vertical is all that is needed. After edging, the marks at expansion joints, but not at side forms, should be lightly brushed out. The joint should be straight-edged as specified in Item 450.03(l)6.

Concrete outside the forms or "dead" concrete should never be used in edging operations.

7. <u>Curing</u>

Curing is usually done by impervious membrane or sometimes by a combination of wetted burlap the first day, which is then removed and followed by impervious membrane. The burlap must be kept wet for the entire time it is in use. This is difficult in hot weather but must be enforced. For this reason the Contractor will generally prefer the membrane. The ALDOT Concrete Technician must realize that the purpose of this protection, whatever the method, is to prevent rapid loss of moisture by evaporation from the concrete mixture. It is necessary to hold this moisture in the concrete to allow the cement to hydrate fully so that the concrete will, over a period of days, gain its proper strength and durability. The first couple of days of this hydration period are the most critical. The ALDOT Concrete Technician must require that the concrete be fully protected for the curing period.

If impervious membrane alone is used, it should be applied just after the concrete has lost its surface water and the surface has lost the watery sheen. If it follows preliminary curing with burlap, it must be applied within 30 minutes of removal of the wet burlap. Generally, it is sprayed from a machine mounted on a frame riding on the forms. The ALDOT Concrete Technician should note carefully the requirements of Item 450.03(m)3. The mechanical sprayer usually has an adequate windshield. If not, one must be provided. Uniformity of application is necessary, if the moisture is to be effectively sealed in. The ALDOT Concrete Technician should check the square yards covered periodically to see that the rate of application is as specified. Impervious membrane shall be applied under pressure at a rate of one gallon to not more than 135 square feet of surface, applied in two applications, with a spray nozzle or nozzles, in such a manner as to cover the entire surface of the pavement with a uniform film and shall be of such character that it will harden within 30 minutes after application. If applied by hand, the two applications shall be at right angles.

After the application, the membrane should be protected from damage as long as needed. Forms and other objects that might scratch the film should not be dragged across it. If it is necessary to grind down high spots as provided in Article 450.04, the areas disturbed must have another application promptly.

During cold weather, the ALDOT Concrete Technician should ensure that the contractor has on hand adequate materials to protect the paving in accordance with Item 450.03(m)4.

When side forms are removed in accordance with Subarticle 450.03(n), the sides of the slab should be cured with one of the specified curing methods.

Honeycombed areas should be filled with mortar as soon as the side forms are removed as specified in Subarticle 450.03(n).

Reference is made to Section 830, Material Requirements, of the Alabama Department of Transportation's Standard Specifications for Concrete Curing Agents and the Specified Curing Periods for the various agents.

8. Joint Construction

a. Transverse Contraction Joints (Sawed or Insert Strip)

The proper timing for sawing of contraction joints will require the close attention and best efforts of the Project Engineer and ALDOT Concrete Technician. As concrete begins to harden, shrinkage in its volume occurs due to loss of moisture. This shrinkage creates tensile stresses in the concrete which causes cracks to develop.

Transverse cracks will develop about every 15 or 20 feet, and if the slab is wider than that, it will sometimes crack longitudinal. If saw cuts can be made across the slab about l/4 its depth before it begins to crack, these cracks will occur under the cuts, and there will be a series of straight lines across the slab instead of an irregular pattern of cracks. These saw joints could then be sealed. The difficulty is to get the cuts made after the concrete hardens enough to take a saw and before the cracks have started; they start as soon as the concrete begins to harden.

Subarticle 450.03(j) covers joint requirements. The major difficulty is with transverse joints in extremely hot weather. At such times they must be sawed at the earliest possible moment after the concrete will bear the weight of the saw rig and will not ravel excessively under the saw. It should be noted that occasional raveling on a small scale is permissible as being a lesser evil than cracking. A standby saw is necessary in case the saw in use breaks down. Night sawing is generally necessary in hot weather. In which case adequate lights are required.

For all sawing, it is the responsibility of the Contractor to mark accurately the location of each contraction joint assembly before it is covered with concrete, so that the saw cuts can be made over the center of the assembly. A stake outside the forms on each side, between which a chalk string can be snapped to give a line, usually does this. The ALDOT Concrete Technician should see that these are accurately marked. He/she should check the depth and width of the saw cut at intervals to see that a full cut is being made. Side forms at the joints should be removed prior to sawing so that full width sawing can be obtained.

The Contractor can use an approved insert strip inserted in the fresh concrete in lieu of sawing the joint. Also if sawing cannot control cracking soon enough, he/she can be required to use these inserts.

b. Longitudinal Joints (Sawed or Insert Strip)

The longitudinal joint for adjacent slabs poured concurrently may be formed by either sawing or by the use of a filler insert strip. In either case tie bars are required along the longitudinal joint to tie the two

slabs together. The ALDOT Concrete Technician should be sure that tie bars are properly "blocked" above the underlying surface prior to pouring.

If adjacent slabs are being poured at different times a butt joint is required between the two slabs with no sawing or sealing required. The adjacent slabs that are poured separately are tied together with tie bars. For "fixed form" paving, a "key-way" may be used along the inside of the form to accommodate the tie bar that is to be straightened later to complete the tie to the adjacent slab. Where the key-way is not used or where slip form paving is used in separate slab construction, the tie bars may be drilled and grouted into the adjacent slab.

c. Construction Joints

Transverse construction joints shall be constructed when there is an interruption of more than 30 minutes in the concrete operations. No transverse joint shall be constructed within ten feet of an expansion or contraction joint. If sufficient concrete has not been mixed at the time of interruption to form a slab of at least ten feet long, the excess concrete back to the last preceding joint shall be removed and disposed of as directed.

d. Expansion Joints

After the underlying surface has been approved, the expansion joint assembly shall be carefully placed in position at the angle to the centerline of the pavement as shown on the plans, to the proper cross section of the paving slab, and perpendicular to the paving surface. The expansion joint filler shall be limited to the types specified in Subarticle 832.01(c), unless otherwise specified on the plans.

9. Sealing Joints

Before the pavement is open to traffic and as early as is feasible, longitudinal sawed joints between adjacent slabs poured concurrently and all sawed transverse joints shall be filled with joint sealing material of a type specified by the plans. The joint faces shall be clean and surface dry when the seal is applied. Suitable tools for installing the seal to the proper depth and dimensions shall be used. The joints shall be sealed as outlined in Section 454.

Construction Details (Slip Form Paving)

If the pavement is to be constructed without the use of fixed forms, the following provisions shall apply:

All other provisions, which have been previously mentioned in this section of the construction manual, not in conflict, shall be in effect for slip form paving.

Prior to placement of paving, the underlying surface shall be graded by a properly designed machine to the grade and cross section shown on the construction plans and shall have proper density. This layer shall also have been checked for surface tolerance specified in the section under which the layer was constructed.

The inspection work should not differ radically from that of the conventional fixed form method. The underlying surface should be sprinkled ahead of the paver in accordance with Item 450.03(e)2 to help prevent the loss of moisture from the fresh concrete to the dry underlying surface. There is one

additional precaution the ALDOT Concrete Technician must take. With no forms, the underlying surface ahead of the paver will be used more by the Contractor's vehicles with more consequent damage. Batch trucks will use the underlying surface more and will turn closer to the paver. Therefore, the ALDOT Concrete Technician must watch the underlying surface closely and require that it be repaired, dressed, and re-compacted ahead of the paver as needed. The paver track moves on the underlying surface and for a non-automatically controlled paver this controls the elevation and cross-section the finished pavement. The ALDOT Concrete Technician must remember that the final smoothness of the finished surface is directly related to the smoothness of the underlying surface and should see that the underlying surface is prepared accordingly.

For automatically controlled paving, the guide wire performs the same function as conventional side forms in controlling grade, profile, and cross section of the pavement. Piano wire is usually used since it must be stretched tight enough to eliminate even slight sagging between stakes. It should be carefully checked against controlled elevations and held firmly in the bracket. It must be unobstructed, since the sensor sliding along the wire actuates the automatic grade, cross-section and, in some cases, alignment controls. The ALDOT Concrete Technician should sight along the wire at intervals, just ahead of the paver, so that any irregularities can be detected and corrected.

Dowel assemblies are placed in the same manner as for fixed form paving.

The ALDOT Concrete Technician, in addition to the usual duties on fixed form paving, must be alert to the following features of slip form paving. Because the front transverse screed is rigidly fixed to the paver, it may lift the whole paver and ride over a particularly stiff batch thus throwing the whole grade control off. The operator can then "jockey" the forward speed of the paver and the vibration, and cause it to settle down in the concrete and back to correct grade. This does not remedy the hump behind the paver, and if dry batches continue, the paver will ride up again. Batches that are too wet likewise are hard to finish properly and will break down the edge of the slab when the slip forms pass. The only remedy for this is control of the slump, which calls for extra close inspection and frequent moisture tests at the mixer. Without such controls, slip form paving will be a failure.

In slip form paving the edge slump may present a problem. Our specifications allow no appreciable edge slump. The problem of edge slumping is aggravated when attempting to place tie bars in the edge of the paving for subsequent adjacent lane paving. Several different solutions have been attempted to eliminate this problem including a longer trailing form slotted in the middle to accommodate driving in the tie bars, a template placed against the paving with tie bars being driven through the template and pre-set two-piece threaded "J" bolts. The Department is presently utilizing a method of drilling the tie bars into the previously poured slab. The tie bars are grouted into the slab and the adjacent slab is then poured.

Reinforcement may be placed by any of the methods previously described under conventional or fixed form paving. When reinforcement other than continuous reinforcement is required, the Contractor normally uses the two-layer method of placement. The Contractor will generally follow the procedure of placing the first layer with a mechanical spreader, placing reinforcement, placing second layer of paving with spreader within 15 minutes, and coming over the entire depth of the paving with the slip form paver. After the paver and slip form have passed, the only operations to be performed are the final straight edging and correcting humps and low spots, dressing edges of expansion joints, burlap drag, curing, sawing of joints, and sealing of joints as described under conventional or fixed form paving.

Engineering

The Contract pay item and/or the Plan Typical Section Sheets will indicate the type, width and thickness of concrete paving to be placed. Joint spacing, type reinforcing steel and spacing, dowel details and tie bar details will be indicated on the Paving Layout Sheets and/or Plan Special Drawings. Width transitions will be indicated on the Paving Layout Sheets.

A Survey Party will have previously established alignment and grade control elevation stakes and hubs as outlined in Subarticle 105.08(a) or (b). Using these control stakes the Contractor will usually install iron pins at the back of the form line for fixed form paving. A string line will then be stretched from pin to pin at the elevation of the top of form grade. The forms will then be set to the alignment and grade of the string line. For slip form paving a taut nylon cord will usually be installed in the vicinity of the edge of paving where it will be in contact with a sensor on the slip form paver that controls alignment and sometimes grade of the finished paving.

It must be made clear to the Contractor that he/she is responsible for the construction of all Base and Paving layers to the plan specified thickness.

After the concrete paving has been placed, the Engineer will be responsible for flat chaining along the centerline of the completed section and recording these measurements in a field book as to date, station and width for later square yard computation.

Inspection

The following checklist is provided as an aid to the ALDOT Concrete Technicians in the performance of their Concrete Paving duties:

Plant and Equipment Checks

1. The Concrete Batch Plant will be checked by the Division Materials Section to meet the requirements of **AASHTO M-157, ALDOT-352** and the specifications prior to starting batching operations. A copy of the approved Batch Plant Checkout and also a copy of the specified Job Mix must be on file with the Project Engineer. The Division Materials Section will also assist in the checking of transit mix trucks, if used, and also in the checking and calibration of the water metering and timing devices of on-site mixers.

2. The Bureau of Materials and Tests must approve sources of aggregates. Shipments to the project shall be accompanied by **Form BMT-I0**. All stockpiles must be properly separated and controlled as outlined in Articles 106.05 and 801.11. Stockpiles should be free of dirt and other foreign matter. Daily moisture contents, gradation and fineness modulus of sand must be made and recorded on **Form BMT-82. Form BMT-82** will also be used by the Plant Concrete technician to determine proper batching proportions and must be completed at least once daily or at any time moisture content is felt to change. Moisture tests should be run every three hours until percentage remains constant.

3. Cement shipments will be accompanied by **Form BMT-114**. If cement is coming from a non-certified source, samples must be submitted in accordance with frequency of ALDOT Testing Manual for testing. Generally 28 days is needed for the testing of non-approved cement sources.

4. If not pre-tested, fly ash samples should be taken from each shipment in accordance with the frequency of the ALDOT Testing Manual.

5. If water is not furnished from a city supply, samples should be submitted to the Central Laboratory for each source.

6. Additives such as air entrainment, retarders and water reducers are usually pre-tested and placed on the Approved Materials List of the MSDSAR. If not pre-tested samples should be submitted in accordance with frequency of ALDOT Testing Manual.

7. The temperature of cement in the storage bins should be checked at least once daily and recorded in the concrete plant diary and in the daily ALDOT Concrete Technician's report.

8. The Division Materials Section will check batch scales for proper certification during the initial plant checkout. Periodic scale checks should be arranged with the Contractor any time the Concrete plant technician feels that such recheck is necessary.

9. Overhead aggregate bins should not be filled to the point that aggregates from compartments are intermingled.

10. During batching operations, the ALDOT Concrete Technician should observe scales to see that all materials are properly weighed and proportioned.

11. For transit and central mixers, each truck should carry a **BMT-122.**

12. Laboratory facilities meeting the requirements of the Standard Specifications should be provided at the plant site.

13. When deemed necessary for better control of slump and air content, the ALDOT Concrete Technician may be asked by the Project Engineer to perform these tests periodically prior to sending the concrete to the placement site.

14. The ALDOT Concrete Technician should complete a daily technician's report for each day's operation to include the details of all breakdowns, materials received, plant checks, etc.

Roadway Checks

Sub-base

1. Width of subbase should be as shown on plan typical section and/or paving layout sheets. Density, gradation and thickness tests should have already been performed in accordance with frequency of ALDOT Testing Manual.

2. Cross section elevations should be checked with scratch-tooth template or string line and surface straight-edged. Any high and low areas should be corrected. If the Contractor elects to fill low areas concurrently with the pouring of concrete, special note should be made of these areas in the daily technician's report.

3. If soft spots develop in the subbase, material should be removed, replaced and re-compacted to provide uniform pavement support.

4. Sub-base should be wetted immediately ahead of concrete placement to prevent the absorption of moisture from the concrete to the underlying subbase.

Forms

1. Forms should be clean, in good repair and meet the requirements Item 450.03(a)5.

2. Forms should be uniformly supported on the underlying subbase for their entire length. Low areas beneath the form base must be brought to grade with approved material. If the material on which the concrete is to be placed is of soil or aggregate, this same type material can usually be used to fill the low area. If correction is for a very thin lift, the underlying surface may require scarifying in order to properly place and compact the correction material If the underlying material is a cement treated subbase or bituminous concrete base, low areas may be corrected with the satisfactory placement of Bituminous, concrete base or concrete mortar. It is very desirable to minimize, if not completely eliminate, the filling of low areas beneath forms since in most cases it is difficult to obtain stable correction. Slight trimming of high areas beneath the forms is preferred.

Steel

1. Are test reports on file covering reinforcing bars, wire mesh, bars and plastic coated dowel bars?

2. Are dowel assemblies being set at plan specified intervals? Is the dowel basket of substantial design to hold the dowels securely in place and parallel to the roadway surface? Are baskets securely anchored (pinned) to the underlying surface? Are dowels plastic coated and of the plan specified dimensions? Are dowel caps meeting the requirements of Item 450.03(j)7 being used on dowels placed at expansion joints?

3. Are continuous reinforcing bar mats spaced and supported to plan dimensions and details? Wire mesh should be spaced and lapped as indicated plan details.

4. Are tie bars of the proper type and dimensions specified by plan details? Two basic types of tie bars are now being used, these being a straight reinforcing bar or a "J" hooked two piece threaded tie bar. Tie bars for longitudinal joint have been installed by the following methods and the ALDOT Concrete Technician should carefully study plan details to determine the proper method of installation for his/her particular project:

a. Where adjacent slabs are poured concurrently, the tie bars will usually be preset and held in position by supporting chairs.

b. Where adjacent slabs are poured separately and fixed forms are used, a key-way may be provided along the inside of the form into which one-half of the tie bar may be bent. The other half of the tie bar protrudes into the slab to be poured. After the slab has been poured the form and key-way are removed and the reinforcing tie bar straightened to tie to the following adjacent pour. This method is used with the straight one-piece tie bar. For the two-piece threaded "J" tie bolt, one piece is attached to the inside of form and the slab poured. Prior to pouring the adjacent slab, the remaining piece is threaded into the piece that is now contained in the previously poured slab. Plan details may specify that the tie bars be installed by drilling with a specially designed multiple drill rig and grouting the tie bars into place.

c. Stated earlier, the satisfactory placement of tie bars where slip form paving is used has presented problems especially in the control of edge slump. The Department is presently requiring placement by drilling into the poured slab as described above.

5. Prior to placing concrete, the ALDOT Concrete Technician should make spot check measurements of the proper depth and spacing of reinforcing bars, wire mesh, tie bars and dowels. During concrete placement, the ALDOT Concrete Technician should make the same spot check measurements behind the first screeding operation to insure himself/herself that all steel items are being installed and held in proper relationship to the pavement.

Mixing

1. When on-site mixing is used, the ALDOT Concrete Technician must receive **Form BMT-122** with each batch truck. The **BMT-122** will state the number of batches and the water allowable for the batches. The amount of water added during the mixing is important and frequent checks of the slump should be made to maintain uniformity in the mix. Good communication is necessary between the Road and Plant Concrete technicians to maintain good consistent slumps. Variations in slump can result from any of the following reasons:

a. Variation in moisture content of the aggregates.

b. Leakage of water from the discharge valve into the drum of the on-site mixer.

c. Variation in batch sizes due to errors in weighing or spillage.

d. Non-uniformity in grading in each size of aggregate.

2. For on-site mixing, the mixing time will be predetermined and locked into the timer. The ALDOT Concrete Technician should make occasional checks of the mixing time to assure that the timer is properly functioning. Mixing time begins when all material has been emptied into the mixer drum.

3. For Central and Transit mix concrete, the ALDOT Concrete Technician should receive and complete his/her portion of **Form BMT-122** for each truckload of mix.

Concrete Placement

1. Spreading Equipment should be capable of evenly distributing the concrete across the underlying sub grade in one pass.

2. Strike-off should be uniform at the finish elevation or at the proper elevation for the placement of wire mesh if two-layer construction is being used.

3. Concrete should be properly hand vibrated along the edges of forms and along joints to eliminate honeycombs.

4. The ALDOT Concrete Technician will be responsible for making concrete temperature checks, concrete cylinders, concrete beams, air content and slump tests during concrete placement. These tests will be run in accordance with the frequency specified in the ALDOT Testing Manual. **Form BMT-83** will be completed for each day's operation and will contain a record of the tests run. In addition to **Form BMT-83** and the ALDOT Concrete Technician's Daily Report Form, it is suggested that the ALDOT Concrete Technician maintain a field book indicating date of pours, stations of pours, cylinder numbers, beam numbers, results of cylinder and beam breaks, slump and air test results. This "Pouring Record" field book will give ready access in one location to all test results for any day's pour. The Paving ALDOT Concrete Technician should also maintain a field book containing dates, stations,

recorded checks of the depth of tie bars, dowels, and reinforcing steel or wire mesh after screeding. This field book should also indicate checks of curing compound application rate.

5. The Daily ALDOT Concrete Technician's Report should contain such items as station paved, stations straight-edged and comments on results, personnel, equipment, comments on plant or equipment breakdowns, stations of joints sawed and/or sealed, etc.

Finishing

1. Concrete in front of the screeds should be rolling, not sliding. Proper control of slump and air content will insure this condition.

2. It is desirable for the first screed on the first pass to carry a uniform roll of concrete about six inches in diameter. The second screed on the first pass should carry a uniform roll of concrete approximately two to three inches in diameter.

3. Screeds should be lifted at expansion joints to avoid displacement of the joint materials.

4. Longitudinal floating should be held back as far as possible and still permit finishing operations to be completed while the concrete is still plastic.

5. Hand straightedges or floats should be used to correct only minor surface discrepancies. If much handwork is required, corrective measures should be pursued in equipment, placement techniques or mix adjustment.

6. The pavement surface should have not more than about 1/8 inch of mortar over the coarse aggregate nearest the surface. Thus no water should be sprinkled on the surface during finishing operations.

7. Longitudinal joints along the forms and along expansion joints should be edged to the plan-specified radius.

8. The burlap drag is applied when the surface is barely stiff enough to hold the texture. The burlap should be wet, clean and should be dragged so that texture marks are uniform and parallel to the centerline. When not in use the drag should be raised above the concrete.

9. After the surface has been longitudinally textured with burlap, it will be further textured by transverse grooves. These irregularly spaced grooves are called a "tine finish" and should be applied with mechanical equipment designed for this purpose. The function of the tine finish is to prevent water from being trapped beneath the tires of a vehicle, which hopefully eliminates hydroplaning. The depth of the grooves should be measured and recorded in accordance with the frequency and procedure specified in the ALDOT Testing Manual (ALDOT-248).

Joints

(1) The ALDOT Concrete Technician should study his/her plan sheets in detail to insure himself/herself that he/she fully understands all materials to be used and installation details for each type joint required. For longitudinal contraction joints, he/she should assure that the proper tie bars are being used and that they are set to the plan specified dimensions and spacing. For transverse contraction joints, he/she should assure that proper dowels are being used, that dowels are secured in

place with substantial baskets and that dowel baskets are properly spaced. For transverse expansion joints, he/she should assure that they are at the correct location, dowels are dimensioned properly and contain correct expansion caps, joint filler and sealer materials are of the plan-specified type.

2. Longitudinal joints between adjacent slabs poured concurrently and transverse contraction joints must be sawed if not preformed with an approved removable insert strip. Sawing is usually preferred in lieu of the removable strips. During pouring operations the location of each transverse contraction joint must be marked with the use of a protected pin or stake placed immediately outside the edge of paving line. These pins or stakes will be used later for the pulling of a string line directly across the center of the dowel assembly and snapping the saw-line.

3. Sawing should be done before the concrete cracks but late enough that raveling is within reason. Sawing can generally begin at least by late afternoon of the day the concrete is poured and usually requires continuing into the night to complete. However, the exact time to begin sawing will depend to a great extent on atmospheric conditions.

4. The saw cut should be straight and perpendicular to the edge of the pavement. The cut should extend to plan specified depth for the entire width of the slab.

5. The depth and section of the saw cut should be as specified on the plans to later receive the approved joint seal.

6. Prior to sealing joints, they should be thoroughly cleaned by blown air and hand scraping. The type filler, sealing material and/or adhesive should be as specified by plan or specification details.

Curing

1. Curing materials may be any of the types specified in Subarticle 450.03(m). If the type selected must be placed in contact with the concrete, as is the case with burlap, the concrete must have reached sufficient set before placement such that the surface will not be marred. The ALDOT Concrete Technician must insure that proper wetting is maintained on the types of curing materials that require such. Generally Contractors will elect to use membrane-curing compound as the curing agent. If membrane curing compound is used, the ALDOT Concrete Technician should maintain a field book record of the gallons used and square feet covered in order to compute the rate of application as per Item 450.03(m)3. Upon side form removal, the ALDOT Concrete Technician should require curing of the sides of the pavement to the same as for the surface.

2:4 TRAFFIC CONTROL

2:4:A Traffic Stripe, Markings and Legends, Pavement Markers

Description of Work

With the ever-increasing traffic volumes that are now being encountered on our highways, it is imperative that traffic control devices be installed properly and as expeditiously as possible either during or immediately following construction as necessary. The basic types of striping and marking materials now being placed on our pavement surfaces are described as follows:

Traffic Stripe

The color, class, type and kind of stripe to be placed will be designated by the pay item in the contract. The class designates whether the stripe is to be Paint, Standard Plastic, Thin Film Spray Applied Thermoplastic Material, or various Tapes and the type designates whether the stripe is to be reflective or non-reflective. The kind of stripe is designated as temporary or permanent. The dimensions and thickness or rate of application of the stripe will be specified in the Standard Specifications, on Plan Special Drawings, and/or in the Manual on uniform Traffic Control Devices. Two types of paint are now being used by the Department, these being (1) Conventional Paint - consisting of paint with pre-mixed reflective beads. Drop-on beads are added during stripe application to provide instant reflectivity (2) Fast-Dry Paint - consists of paint only, with reflectivity being obtained by the addition of drop-on beads during application of the stripe. These paints are to meet the requirements of Section 856. Heating of fast dry paint is required prior to application in order to accelerate the drying time and eliminate the use of protective cones that are required for conventional paint. Usually a trailing protective vehicle(s) is all that is required to prevent tracking of the fast-dry stripe by the public.

The Department frequently utilizes specialty type materials and/or applications such as "Inverted Profile Traffic Stripe", "Epoxy Paints", etc. on project locations involving high-density traffic volumes. The specifications for these materials and their applications will normally be covered by special provisions, which are included and made a part of the Contract Proposal.

Thermoplastic materials are now being furnished primarily in granular or block form. As the prefix "thermo" implies, this is a plastic material that is placed in a hot molten state. Basically after melting, the plastic is placed by extruding through a screed shoe or ribbon die. Drop-on beads are required immediately after application. As an alternate to the hot applied thermoplastic stripe, our specifications have recently allowed the use of a cold-laid plastic stripe. The cold-laid plastic material is furnished with an adhesive backing or separate primer dependent upon application. In some instances, It is laid on the freshly placed plant mix wearing surface immediately prior to final rolling and is actually rolled and "inlaid" into the surface to enhance its adhesive characteristics.

Equipment used in any striping operation, whether paint or plastic, will basically consist of equipment for cleaning the pavement, application of the stripe and protection of the installed stripe until dry. Cleaning equipment will range from hand shovels and brooms to possibly mechanical brooms and/or motor graders for the removal of dirt and vegetation along the centerline or edges of the surface to be striped.

Application equipment will consist of a machine that is adjustable for applying one or two adjacent lines to the specified dimensions and rate of application. The machine must also contain attachments for cleaning dust immediately ahead of placing the stripe and for application of drop-on beads immediately following the stripe placement. Most Contractors are now using truck mounted application

machines, which contain adequate flat bed space for paint or plastic agitator storage tanks. Operation of the application machine requires a driver in the cab of the truck who is responsible for alignment control. Most paint trucks now have separate dispensing controls at the rear of the vehicle, which require a separate operator.

Plastic stripe materials that are placed by extrusion are installed with the use of a special designed hand pushed machine. This machine basically contains only a small heated storage area for hot plastic material with "die" attachments for the extrusion of the material to the specified width and thickness. This method of placement will require that the heating kettle used in melting the plastic material be immediately available for ready filling of the small machine. This machine also contains an attachment for the application of drop-on beads.

Traffic protection equipment will usually consist of a trailing truck loaded with cones that are placed immediately after the placing of a conventional paint stripe. In the placement of Fast-Dry paint or Thermoplastic Material, the cones usually can be eliminated and the trailing vehicle(s) will only contain an overhead flashing arrow board to warn the traveling public.

Markings and Legends

Markings will consist of such items as stop lines, cross hatching, eight-inch channelizing lines, and pavement arrows, etc. Legends consist of the placement of letters or numbers. These type pavement markings ordinarily can not be placed with the large automatic type equipment used for striping.

The dimensions and configurations of markings and legends will be indicated on Plan Special Drawings and in the Manual on Uniform Traffic Control Devices. The location of the markings and legends will usually be shown on the Plan Paving Layout Sheets or in some cases Special Plan Sheets will be devoted to striping and marking details. Where the Project Engineer is uncertain of the proper location for markings and legends, the Division Traffic Engineer can usually offer able assistance. If needed, the Division Traffic Engineer can indicate all required striping and marking details on the Project Plan Paving Layout Sheets for use by the Project Engineer.

Diligent cleaning of the pavement surface should be required prior to the installation of Markings or Legends. The same equipment used for cleaning preparatory to striping will also be used for cleaning in preparation for markings and legends.

In order to maintain neat lines on markings and legends, the Contractor will generally use a thin metal template placed flat on the pavement surface. If paint is required, the paint will usually be applied with the use of a hand spray gun. Plastic will be applied with the special hand push machine previously described under striping. Excess thermoplastic remaining on the template after placement must be removed and discarded. For plastic material, the drop-on beads will be applied through an attachment on the machine, supplemented by hand spreading. For painted markings and legends, the drop-on beads must generally be placed by hand spreading.

Cold Laid Plastic, mentioned under striping, is also being used by the department as an alternate for hot markings and legends and should be placed in accordance with manufacturer's recommendations.

Raised Pavement Markers

The Class and Type of pavement markers to be placed will be indicated by the contract pay items. The Project Engineer through a study of the Plan Special Drawings must determine the location and spacing of each.

The purposes of the raised pavement markers are to supplement and more clearly distinguish previously placed pavement markings. Pavement markers are of particular benefit to the motorist at night and during periods of rain. In general, the color of the marker should be compatible with the color of the striping or marking adjacent to which it is placed; for instance, crystal with white and amber with yellow.

Raised Pavement Markers are affixed to the pavement surface with the use of a bituminous adhesive meeting the requirements of Article 870.02. The bituminous adhesive must be pre-heated and the exact amount required for each marker automatically metered on to the pavement surface by a machine especially designed for this purpose. After placement of the adhesive, the raised pavement marker is affixed in the correct location by hand. The surface to which it is placed must be cleaned of all foreign matter prior to installation.

When placed, it will be the Contractor's responsibility to adequately protect the marker from being hit by traffic until the bituminous adhesive has taken set.

Engineering

Only a minor amount of engineering control and field staking will be required for the items covered in this section.

Unless otherwise noted in the contract, the Contractor will be responsible for providing adequate alignment control to place pavement striping in the proper locations. In some instances the Contractor may follow an existing stripe or longitudinal paving joint. More often, however, he/she will want to establish alignment control by placing a series of painted dots along the centerline or broken line location. These dots are usually spaced from five to ten feet apart on tangents and more closely in curves. After painting the centerline, it can then be used for alignment control in painting the edge line.

The Engineer will mark No-Passing Zones in accordance with Item (701.03(e)1 and Part III Section 3A-7 of Manual on Uniform Traffic Control Devices. The beginning and end of each barrier line can be marked with an arrow placed on the pavement surface on the proper side of the centerline and pointing in the direction of the barrier line. The location of the beginning and ending points can be permanently referenced and maintained by the placement of appropriate sign panel arrows mounted on "U" channel post at some distance from the edge of paving.

Pavement markings and legends will usually require that the Engineer only relate to the Contractor the proper location for the marking or legend. The Contractor can then utilize Plan Special Drawings to properly layout the markings or legends at the designated location.

Installation of raised pavement markers can be accomplished totally by the Contractor through his/her study of appropriate Plan Special Drawings.

Inspection

The following checklist is provided as an aid to the ALDOT Inspector in the performance of his/her duties:

(1) Surfaces on which striping, markings and legends or pavement markers are to be placed must be cleared of all foreign matter.

(2) Edges of all stripes, markings and legends must be neat without splatter.

(3) Stripes, markings and legends must be of plan specified dimensions within specification allowed tolerances, if any.

(4) For paint striping, legends and markings, the inspector should record each day the total gallons of paint and pounds of beads used in order to compute the rate of application as compared to specification requirements. Periodic checks should be made at least twice daily to see that the specified rate of application of paint and beads are being maintained.

(5) For plastic stripe, markings and legends, the rate of application is checked by thickness measurements. Bead application is checked by the pounds of beads applied per square foot and thus the total pounds used per day should be recorded with at least two periodic checks during the day of operation. Thickness of the plastic is checked by placing thin metal plates approximately four inches by six inches in a normal run. After the plastic has been placed by ribbon die or extruded by shoe die on the plate and allowed to cool, the thickness measurements can be made. Thickness measurements can also be checked utilizing a metal template notched to the required thickness. The notched section of the template can be placed over the stripe to verify the thickness. Thickness measurements for plastic stripe should be made for each 1/2-mile.

(6) Application temperature for thermoplastic must be maintained at manufacturer's recommendations, usually approximately 410ºF.

(7) A primer-sealer is required on most surfaces as per Subitem 701.03(e)3b prior to application of thermoplastic.

(8) Immediately after placement of paint or plastic stripe, the inspector should begin checking alignment, length and width to be within specification tolerances.

(9) At present the Department does not allow the placement of thermoplastic materials until they are tested by the Department's Central Testing Laboratory. Certifications from the manufacturer or material guaranties should not be accepted to allow placement of thermoplastic materials.

(10) Paint and plastic materials are presently pre-tested by the Department according to Batch numbers. To verify testing, the Project Engineer need only record the batch numbers delivered to the project for use and relay these numbers to his/her Division Materials Engineer for verification of testing by the Central Laboratory.

(11) If Drop-On beads are not pre-tested by the Department, samples must be submitted to the Central Testing Laboratory in accordance with the frequency of the ALDOT Testing Manual.

(12) Pavement Markers must be furnished by one of the suppliers indicated in the Department's approved Qualified Traffic Control Materials List of the MSDSAR. In addition, verification samples should be submitted to the Central Laboratory for testing in accordance with ALDOT-195 of the ALDOT Testing Manual.

(13) Adhesive materials that are not pre-tested for use with pavement markers will require the submission of samples for testing in accordance with the frequency of the ALDOT Testing Manual.

2:4:B Traffic Control Roadway Signs and Overhead Roadway Sign Structures

Description of Work

Roadway Signs

The primary function of a roadway sign is to convey directional, command or warning messages to the motorist. In order to properly convey the message, the sign panel must contain a legend with proper balance and must be located such that it is free from obstructions to visibility.

The class of the sign panel and material of which it is to be constructed will be designated by the contract pay item and plan Summary of Quantities Sheet. The type and size of posts to be used at each location will be designated on the Plan Box Schedules. Layout Drawings showing the exact arrangement of panels and legend for Class "I" and "2" sign panels will be shown on the plans. Some change in plan designated post size may result after field cross sections are taken and wind charts applied to each individual location.

Construction details such as breakaway features, size of footing, stub sizes, reinforcement, panel attachments, etc. will be shown on Plan Special Drawings. No submittal of shop drawings will be required unless such is needed to detail some feature that is not shown on the plans.

The location of roadway signs will be specified on the construction plans, but this location may require adjustment due to utility conflicts, drainage conflicts or better positioning for proper conveyance of the message. Project personnel should consult their District Engineer, Division Traffic Engineer and Division Construction Engineer for verification of the final location of all signs prior to installation. The maximum and minimum lateral and vertical clearances should be as specified in the "Manual on Uniform Traffic Control Devices" or on the plans. Project personnel should strive for the maximum lateral clearance and the minimum vertical clearance. Consideration should be given to the sign overhang in determining lateral clearance. Lateral clearance is measured from the edge of the sign to the edge of the pavement, paved shoulder or face of curb, whichever is applicable. Vertical clearance is measured from the edge of pavement or top of curb elevation, whichever is applicable, to the bottom edge of the sign.

During installation the post should be checked with a spirit level for vertical alignment. They should be set so that the sign panel will be at the proper angle to the roadway to eliminate or minimize specular (mirror-like) reflection and provide maximum readability.

For breakaway features, the bolts should be torqued to the tension specified on the construction plans. Bolts previously installed to a "snug" condition should be loosened and reset to the required tension. The torque wrench used should be calibrated for tension with a "bolt-tension calibrator". The Skidmore-Wilhelm gauge is generally used. All torqueing, lubricating, etc. shall be performed in the presence of an Inspector. For breakaway post, special shims may be used to correct minor deficiencies in vertical alignment.

Erection of sign panels shall be done in a neat and workmanlike manner. Sign panels shall be attached to the supporting frame in accordance with the recommendations of the sign panel manufacturer and as detailed on plan and/or approved shop drawings.

If the galvanization is broken on any galvanized components, they should be repaired with repair paint as specified in Article 855.15 of the Standard Specifications.

The existing sign assemblies should be removed immediately after the new assembly has been installed and ready for use. The removed sign panels, posts and assembling hardware should be stacked and stored in such manner as damage will not occur until these materials are picked up by ALDOT forces. Attention is directed to Subarticle 710.03(f) of the Standard Specifications.

Warning markers should be placed at signposts (which have no panels), open holes and other hazardous conditions, which might exist during the installation of roadway signs.

Any areas disturbed during sign installation should be restored to their original condition and grassed.

Overhead Roadway Sign Structures

Overhead sign structures and footings are basically to be designed by the Contractor from the line diagram and boring logs (With passive pressures) shown in the construction plans. The design drawings should include all footing, member and electrical details and should be submitted in accordance with Item 715.01(b)2 of the Standard Specifications. The design and shop drawings must be approved by the Departments Bridge Bureau and the Central Testing Laboratory notified prior to the actual fabrication of the overhead structure.

Legends for the sign panels to be placed on the overhead sign structures will be shown on plan Special Drawings. For Class "1" and "2" panels, Layout drawings detailing the exact arrangement of panels and legend lettering will be shown.

Engineering

Roadway Signs

After the final location of the roadway sign has been established, a cross-section should be taken at each location and plotted to determine the required lengths of each signpost. Post lengths should be furnished the Contractor, in writing, by Station number, Sign number, and size of post required. This letter should also include a general sketch covering all post assemblies, which indicates the limits of the post length to be furnished. (Subarticle 710.03(b) This sketch will help make it clear to everyone the extreme limits of the post lengths requested and whether the stub length is included. For a project where signs are the major item of work this information should be furnished to the Contractor immediately after issuance of the "Notice to Proceed" but no later than the time of the Pre-Construction Conference. For projects where signs are a minor item and are not a first order of work, the information should be provided the Contractor at the earliest possible time to avoid any project delay.

Overhead Roadway Sign Structures

Project personnel should verify the cross section and elevations shown on the construction plans for each structure. Any necessary changes or revisions from those shown should be furnished to the Contractor for his/her use in preparing his/her design drawings. These changes should be furnished to the Contractor immediately after issuance of the "Notice to Proceed" but no later than the time of the Pre-Construction Conference.

Inspection

Roadway Signs

The Central Laboratory will check the color and reflectorization on the sign panels after they are received on the project. The Central Laboratory should be given notice as soon as the panels are received so that proper checking of these items can be made prior to installation. During this review the legends should also be checked for proper wording, spacing, etc., and all dimensions of the panel checked.

Following is the Department's procedure for the sampling and testing of sign materials:

It is expected that all certifications and material samples be submitted through the Project Engineer and when he/she is satisfied that they are in accordance with Department requirements, he/she should submit them to the Bureau of Materials and Tests for testing. Because of the excessive failures, which have been encountered on previous sign tests, and in accordance with Subarticle 106.02(a) of the Standard Specifications, sign materials should not be accepted on the materials guaranty basis. In addition, sign materials should not be installed on a project, and no partial payment is to be made for these materials until receipt of passing test reports on the materials.

All hardware such as bolts, nuts, washers, angles, channels, etc. and samples of aluminum, panels, reflective sheeting, etc. should be shipped to the project site with the sign panels. Certified tests reports as required in 880.0l(a)3, 880.0l(b)2, 880.0l(c)10, 880.0l(d)5,and 880.01(e)4 should be shipped with their respective materials.

The following is a list of items which require that samples or certifications be furnished for the issuance of required test reports. Project personnel should refer to ALDOT'S "Testing Manual" and "Material Sources and Devices with Special Acceptances Requirements" for guidance on submitting certifications, samples, sample sizes, quantities of samples, etc. for each material item.

Sign Sheets (includes laminated panel sheets)

Miscellaneous Metals (Angles, channels, etc. used for stiffeners and/or mounting brackets)

Bolts, Washers, Nuts, etc.

Porcelain Enameled Panels

Laminated Panels (Complete Assembly)

Reflective Sheeting

Demountable Copy

Screen Copy

Sign Posts

Steel and Aluminum (Tubular and Beam)

Steel ("U" Channel)

Since some samples are used for comparisons with the sign panels on the project, the Bureau of Materials and Tests will send inspectors to the field to make these comparisons. These inspectors will coordinate their visits through the Division Office. At the time of the inspections, all signs should be uncrated and visible, or the Contractor must have personnel present to move the signs around. The Project Engineer is to have the approved sign panel shop drawings and plans present, and he/she is to make all color and dimensional comparisons with the shop drawings at this time.

These procedures should be covered in detail during all pre-construction conferences for projects, which have signs as bid items in the contract. Copies of these instructions should also be furnished the Contractor, and it is his/her responsibility to get them to his/her sign fabricator. (Refer to ALDOT Testing Manual ALDOT 245)

It is suggested that the Inspector set up a field book containing a sketch of each required sign assembly with the following information: Station No., Sign No., class and type sign, square feet of sign panel, sign legend, post type, size, and length. As each sign assembly is completed, the date of completion should be entered under the sketch. This book may then be used for monthly and final estimate documentation.

If transit mix concrete is used, the Inspector will be required to receive and complete his/her portion of **Form BMT-122**. He/she will also be required to complete **Form BMT-83** for each day's pour, along with the daily inspector's report. He/she should also see that the "Sign Book" detailing each assembly, is kept up to date.

Overhead Roadway Sign Structures

The inspector of these structures must have on hand a complete set of the approved design drawings, which were submitted by the Contractor. These drawings will detail all members of the overhead structure as well as footing details.

Foundations should be excavated to the dimensions shown on the approved design drawings. Prior to pouring the foundations, the reinforcing steel should be placed and the spacing of the bars checked. Normally, a template will be used to secure the anchor bolts at the proper location. The Inspector should assure that sufficient threads are exposed above the top of the foundation, so that after proper leveling and raking of the structure upright, at least a full nut of threads will remain above the top of the upright base plate. If electrical conduit is required, the Inspector should check to see that the conduit "stub-out' is installed in the proper location prior to pouring.

In general, the elevation of the top of the foundation should not extend more than four inches above natural ground on the uphill side.

Care should be taken during the pouring of concrete to insure that reinforcing steel and anchor bolts are not displaced and that the height of free fall of the concrete does not exceed the limit specified in Section 50l. Concrete should be vibrated during placement. The top of the foundation should be finished in a workmanlike manner and edges chamfered, where specified on the construction plans.

All parts of the structure should be assembled on the project, usually at the sign site. After assembly the Inspector should check to see that the structure contains all the required members and design features in accordance with approved design and shop drawings. The structure uprights and horizontal members should be erected in accordance with adequate field erection details provided by the Contractor. If the structure is erected under traffic, proper signing as well as other safety requirements should be observed.

If electrical features are included on the structure, proper personnel (Division Traffic Engineer and State Electrical Engineer) should be advised for checking electrical features specified under testing, Item 715.03(b)4 of the Standard Specifications.

In the excavation for electrical conduit runs, care should be taken in properly compacting backfill material. Rock encountered at the bottom of the trench should be excavated three inches below the bottom of the trench and backfilled with a three-inch layer of sand or earth. Excavated areas should be restored to their original condition and dressed to blend with the surrounding area to include grassing or re-grassing the area with the proper specification seed mix, sprigs or sod. Settlement problems of excavated areas should be corrected as they occur. When excavating across streets, sidewalks and other improvements, the excavation should be done in such manner as to cause the least possible damage to the facility.

If transit mix concrete is used, the Inspector will be required to receive and complete hi/her portion of **Form BMT-122**. He/she will also be required to complete **Form BMT-83** for each day's pour, along with the daily inspector's report.

The inspection of sign panels will be the same as previously described for roadway signs.

2:5 Rest Area Facilities

Description of Work.

This section shall cover the special items involved in the construction and renovation of Rest Area Facilities, which are not a part of "normal" roadway construction. These facilities include Welcome Center and Rest Area Buildings, Scenic Overlook Shelters, Storage Buildings, Water Systems, Sewage Treatment Systems, grounds for picnics and parking, and related appurtenances.

Welcome Center Buildings are, in effect, rest areas at State boundaries. Tourists are welcomed into our State and provided with information about Alabama's points of interest by the Welcome Center Staff, who are employed by the Bureau of Tourism and Travel. An architectural firm hired by the Department designs the buildings, water systems, sanitary sewage facilities and related appurtenances. The Department performs design work for any necessary roadway or parking lot expansion and coordinates its efforts with the Architect for inclusion into the plan assembly. The Department, with the Architect reviewing the required submittal data, handles the contract administration.

Rest area sites, not located at State boundaries, are handled in the same procedure as Welcome Centers.

All rest area sites are provided with a storage building, which is used by the department's maintenance personnel for housing their equipment and supplies necessary for maintaining the buildings and grounds. Vending machine buildings are also provided to accommodate soft drinks and snacks for the convenience of the traveling public. These buildings are normally strategically located so as not to distract or take away from the primary structures of the facility. When a Rest Area is to be constructed or an existing Rest Area is to be renovated, the designer should insure that the new construction or renovation complies with or brings into compliance all aspects of the facility in accordance with the requirements of the Americans with Disabilities Act.

Scenic Overlook facilities are placed at strategic locations along our highways where scenic views of the surrounding landscape can be enjoyed by the public. The facility usually consists of a viewing shelter and parking area. At some locations, picnic tables may be provided.

Water systems may be a well with storage tank or the water lines may be attached to an existing local water system.

Sewage treatment systems may either be septic tanks with disposal fields, sewage lagoons, or with the use of a pumping system tied to a public treatment facility.

The special materials required for rest area facilities have their specification requirements given in Special Provisions, on the detailed plan sheets and on specification plan sheets. Pipes, concrete, expansion joint material, etc., incorporated into the septic tank and field lines, sewage lagoons, outdoor shelter pads, etc. are referenced to Architectural specifications. Items that pertain to roadways or parking lots are referred to the appropriate 800 Section in the Standard Specifications Book.

Manufacturer's names, trade names, brand names, model numbers, styles, etc may specify items. These designations are used for the purpose of stating quality requirements. For example, paneling may be specified as "top grade wood paneling, Birch, 1/4" thickness, as manufactured by Weyerhaeuser, or an approved equal."

Some items have their material requirements completely detailed in the plans. An example of this is the requirements for the preservative treatment of lumber, which are listed on the specification plan sheets.

Other items may require that data be submitted for quality determination, color selection, style selection, etc. Examples of these are electrical materials, finish hardware, paint charts, brick samples, paneling samples, etc.

The requirement of submittal data for determination of quality is necessary to insure that a top line quality item is being furnished. Different grades of quality are available for some items.

Designating materials does not limit the Contractor to use only that particular item. The Contractor may substitute another item if it is equal in quality to the specified item. In the paneling example, the Contractor could use any brand of paneling which would meet the quality of the Weyerhaeuser brand paneling. When the Contractor wishes to use an item different from that specified, approval must first be received from the Construction Bureau before the item is incorporated into the facility. The Contractor submits data by which the quality of the item can be determined. The data is forwarded to the Construction Bureau through the usual Division channels.

The processing of submittal data is probably the biggest problem encountered by Project Engineers constructing Rest Areas. In many instances the Prime contractor for a Rest Area project has not previously performed contract work for the Department. Thus, he/she is not familiar with the Department's specifications and project procedures. The specification requirements are normally more stringent and he/she is not free to substitute items without prior approval as may have been the case on private work.

The Contractor should be given as much assistance as possible to help him understand what is required of him in regards to submittal data. The Project Engineer should thoroughly review the plan assembly, contract documents and develop a checklist of all items or materials, which will require submittal data. A determination should be made as to what information is required to be provided for the particular item or material.

The Contractor is required to submit all data in accordance with conditions, specifications and Special Provisions of the Contract after the Notice to Proceed is issued. The early submission of data should be stressed to the Contractor so that the project will not be delayed. Much construction time is lost by delays in the submitting of data by the Contractor, incomplete data and materials not meeting Specifications. The Contractor's progress is slowed, even stopped on occasion, because a particular item has not been approved and work cannot proceed until it has been installed. No item or material should be used or placed in the facility before approval is given to the required submittal data.

The Project Engineer should review all submittal data for completeness before forwarding. For example, when the Contractor submits data on the electrical materials, it should be checked to determine that all items are covered by the data. If data is missing, a note should be made in the project diary and the contractor should be requested to furnish the additional information.

Good records should be kept concerning submittal data as to what data is furnished, when furnished, and if approved. The Project Engineer should set up a file for incoming submittal data and a separate file for approved submittal data. The building and appurtenances Contractor should furnish six copies of submittal data with the exception of brick and paneling samples, which require only two samples each. The Project Engineer retains one copy of the data with the other copies being forwarded.

When the submittal data is approved, the Architect retains one copy and the remaining copies returned for use and distribution. The Construction Bureau retains copies of the transmittal correspondence only.

The final approving authority for submittal data is the Construction Bureau, but the Project Engineer plays an important role in the process by obtaining the data from the Contractor, reviewing it for completeness, forwarding for approval, and with approval received, verifying that the item or material is used in the facility.

Engineering.

Rest Area Facilities are for the comfort of the traveling public and also are good sources of publicity for the State. This makes aesthetics an important consideration in the construction of the facilities. The site should be constructed in a manner which will leave the landscape as undisturbed as possible. Particular attention should be given to the stakeout of the buildings, setting of slope stakes for the ramps and parking areas, layout of the sidewalk and outdoor shelters in order that as many as possible of the established trees will be preserved.

The Engineer should make a thorough review of the existing conditions with the proposed grades and sections in mind. Will the proposed grades fit smoothly into the terrain? Can the alignment and grades of the ramps be adjusted to reduce clearing requirements? Are the outdoor shelters and picnic table sites easily accessible and well drained? At least one outdoor shelter should be located to accommodate a wheel chair. Grades of sidewalks for wheel chair traffic can not exceed five percent. Layout of sidewalks should be accomplished with minimum disturbance to the area. Excessively winding and twisting sidewalks are not desirable. Proposed changes should be discussed with the Division Construction Engineer who will contact the Construction Bureau if the change is significant.

All clearing, except that required for the ramps, parking areas, and sewage lagoon, should be selective clearing. When possible a screen of trees should be left between the lagoon area and the rest of the site. Some undergrowth may be left to aid in the screening. Professional assistance is available through the Maintenance Bureau to help the Engineer determine which trees should be removed. The Engineer's scheme of marking should be discussed with the Contractor to insure his/her understanding. Select clearing usually requires special equipment and possibly hand labor; therefore, all areas should be marked so that one operation will complete the select clearing.

Dead, diseased or undesirable trees and undergrowth should be removed with care to protect the natural ground cover. Normally, trimming and treatment of damaged trees shall be in accordance with Standard Specification Subarticle 860.10(d). Other requirements for the clearing and grubbing process can be found in the Grading and Drainage Section of this manual.

The drainage and paving operations are handled in accordance with the guidelines for normal roadway work.

The Engineer is required to establish the corners of the particular buildings and to provide an elevation for the Contractor. The layout of the floor plan, plumbing, sewage lines, etc., is the responsibility of the Contractor. Occasional checks should be made by the Engineer to insure compliance with the plans.

When a sewage lagoon is planned for waste treatment and the effluent is to be discharged into a flowing stream or if the effluent is to be discharged by aerial spray application to the grounds surface an

NPDES permit for the construction and operation of the lagoon will be obtained from the Alabama Department of Environmental Management (ADEM). Construction of the lagoon must then be in accordance with the permit requirements. An early review of the sewage system plan details versus the site conditions is a must to provide ample time for resolution of changes with ADEM and to prevent delaying plan development. If the sewage is to be handled by septic tank and field lines a construction and operation permit will be obtained from the Health Department starting with the local County Health Department having jurisdiction over the area. Once the project is awarded and construction begins, any variation in the sewage system from that detailed by the plans must be approved by the construction Bureau.

Once construction begins the lagoon bottom and dike area should be cleared of all vegetation, including stumps. The bottom should be level. Density requirements are the same as for embankment layers. A survey party will provide the necessary lines and grades in the same manner as for a roadway section. Original cross-sections are to be taken and slope stakes should be set around the perimeter of the lagoon. Cross sections should be taken prior to and after the placement of the clay liner.

Elevation of manholes, flow line elevations within the lagoon and out-fall pipe grades should be provided to the Contractor.

Inspection.

The grading, drainage and pavement operations require the normal inspection. The inspector should familiarize himself/herself with the specification and plan requirements for the different phases of work he/she will be inspecting. The testing and sampling procedures should be reviewed for each item of work.

The inspector should observe the select clearing operation to determine if the Contractor is using equipment and clearing techniques which will cause the least disturbance to the natural ground cover and to the remaining trees. The Contractor should properly dispose of the debris.

It is important that the sewage disposal system be constructed to the plan dimensions and elevations. Almost all disposal systems are gravity flow making the structure elevations and pipe grades critical to the proper functioning of the completed unit. Verify that the installation and connection of the chlorinator unit, holding tank, weir plate, dumping bay, etc. are in accordance with plan details. Check the clay liner for material requirements, thickness and density. Care should be taken in the backfilling of the clay liner around pipes to prevent a possible leak. Verify that items and materials, which required submittal data, comply with the approved data. It is the Contractor's responsibility to notify ADEM or the Health Department of his/her construction of a sewage system for their inspection, etc. If an ADEM or Health Department inspector should request changes in the facility, the Construction Bureau is to be contacted before making the changes.

Considerable study may be required of the Inspector to acquaint himself/herself with the specifications and construction details for the buildings. The Inspector should check to verify that the materials and items incorporated into the facility comply with the plan details and approved submittal data. The Contractor should never be allowed to substitute any item without prior approval of the Central Office. The reason for this is that a visual inspection of an item will not necessarily allow determination of the quality. An analysis of the material's specifications is needed and sometimes the operational procedure has to be compared. The specifications require top line quality items and materials. Different grades of quality may exist for the same item. Therefore, a thorough review is necessary to determine that a substitute item is equal to or better than the specified item.

The Inspector should check all handicap facilities to insure proper location and installation. The sidewalk providing access to the building from the handicap parking area should have a maximum slope of five percent with four foot level areas every 30 feet.

2:6 BRIDGE STRUCTURES

On bridge work, as on other work, the Project Engineer has the direct responsibility for the inspection of the construction of the bridge to the lines and grades specified on the plans and in accordance with the Specifications. Any matter that arises that must be decided at a higher level should be handled through the District Engineer to the Division Construction Engineer and then to the Construction Bureau if necessary. The Construction Bureau will contact the Bridge Bureau, Bureau of Materials and Tests, etc., when matters concern them.

The Project Engineer, after the structure has been staked out and the layout double-checked by an independent survey party, should examine the site with the bridge plans in hand. If any changes of consequence have occurred since the original location, i.e. any flood conditions, changes in stream channel, improper railroad horizontal clearances, etc., the District Engineer should be contacted and made aware of the changed conditions. A decision can then be made and the plans revised, if necessary. The Project Engineer should make sure the Contractor understands the procedures for submitting shop drawings, working drawings, pile driving hammer submittals, drilled shaft installation plans, etc., so that they can be submitted early enough for the required review. Where utilities are involved, such as a railroad, approval is often required from the utility and ample submittal time should be allowed. The Contractor should be made aware of what materials will be tested and require a test report so that the work will not be delayed due to the lack of adequate material testing. These items can usually be discussed at the pre-construction conference.

2:6:A BRIDGE STRUCTURES (SUBSTRUCTURES)

The Project Engineer needs to be aware of the accuracy required during the substructure construction. Mistakes, whether plan or construction, which are not found and corrected during this stage of construction become extremely difficult and costly to correct during or after the construction of the superstructure.

All work should be carefully inspected during all phases of this construction including excavation, backfill, placement of steel reinforcement, etc., to insure that the substructure is constructed to the correct lines and grades. Line and grade should be checked upon completion of each substructure unit to ensure that they meet specification tolerances. If at any time the Inspector finds a construction mistake or conflict with the plans, then he/she should make the Project Engineer and Contractor aware of this and get it resolved before construction continues.

2:6:A:1.1 BRIDGE FOUNDATIONS

Description of Work

The foundation of a bridge is the natural rock or other material on which the footing is founded. The plans will show soil information at the bridge site and an approximate elevation to which each footing is to be carried, based on core boring information. Boring information will be located in the plans. The Inspector and Project Engineer must watch for any changes in foundation conditions from those shown on the plans or indicated in the borings. If it becomes apparent that satisfactory bearing material is reached above that shown on the plans, or if the material encountered at the depth of footings shown on the plans is apparently still not satisfactory, the Inspector should promptly notify the Project Engineer. The Division Construction Engineer may then make a decision as to what the foundation elevation should be, if needed. If it is determined that the foundation elevation needs to be raised any or lowered more than five

feet the Construction Bureau should be contacted to determine if these changes will conflict with the scour prediction or the column design size.

Most bridge foundations can be approved at the Division level. However, for deep river pier foundations and other complicated cases, the Construction Bureau should be contacted through the Division Office to determine whether or not they need to make an inspection before the formwork or concrete placement is started.

The Contractor is also charged with the responsibility of notifying the Engineer of any changes from plan soil data as excavation progresses. The specifications provide for additional investigation by drilling or probing in cases where needed. {See Items 215.03(a)3 & 215.03(a)4} Ordinarily, such investigation is ordered only after consulting the District Engineer.

The Contractor must not be permitted to excavate wide, open holes, especially near embankment or footing locations where erosion might be induced. In excavating for a lower pier foundation, precaution must be taken to prevent any ground movement that might disturb foundation conditions at a pier higher up on the stream bank. When direct bearing footings are specified, the foundation material below the bottom of footing elevation shall not be disturbed.

The method of excavation for a foundation will depend on the type of material present and the location of the footing. Because of the different types of equipment available to the Contractor, there are very few excavation problems encountered when excavating on dry land. When excavating in water, which is normally inside a cofferdam, excavation problems are more common.

The primary method for excavating inside cofferdams is with an airlift. The airlifting operation can be an effective operation if it is performed correctly, but it can be totally ineffective if it is not. The effectiveness is primarily based on two things: (1) the depth of the water and (2) the height of the discharge end of the airlift pipe above the surface of the water.

The airlift operates by having compressed air fed into the bottom of the airlift pipe. The air expands and rises upward to the surface of the water through the pipe. This creates suction in the bottom end of the pipe, which pulls the loose material in the excavation up through the pipe (the greater the depth of waters the greater the suction). Once the air reaches the surface of the water it loses its pulling ability; therefore, the airlift operates best when the discharge end of the pipe is near the surface of the water.

When a contractor is using an airlift, the discharge end of the pipe is normally above the top of the cofferdam sheets. The height of the cofferdam above the water is, therefore, very important since clear water coming out of the discharge end of the airlift normally indicates that the excavation has been completed and it is ready for the underwater inspection. The contractor should be made aware at the pre-construction conference that if the inspection shows that the excavation is not completed, then he/she will be required to perform whatever work is necessary (employ a diver, cut holes in his/her cofferdam sheets to discharge through, etc.) to complete the excavation. By making him aware of this at this conference he/she should make an extra effort to insure the excavation is completed before the underwater inspection.

Footings

Footings are basically of three types; direct bearing footings, pile footings or drilled shafts.

a. Direct Bearing Footings

Direct bearing footings are classified as one of the following three types:

1. **Rock footings** are reinforced concrete footings, which must be securely keyed into solid rock to prevent sliding of the structure. These footings are the smallest of the direct bearing footings.

2. **Spread footings** are reinforced concrete footings and are larger than rock footings. They are placed on stable soils with bearing values that are less than those required for rock footings.

3. **Seal concrete footings** are normally the largest direct bearing footings. These are placed on solid rock and other hard materials, such as Selma Chalk, and are poured underwater in cofferdams. These footings are constructed where it is impractical or impossible to de-water a cofferdam and construct a footing in the dry. Since it is usually impossible to inspect the foundation material after excavation, an underwater inspection by the Department's divers must be made and documented on all footings which are to receive seal concrete, except pile footings, unless approved otherwise by the Construction Engineer. After the Contractor notifies the Project Engineer that a footing is ready for inspection, the Engineer should immediately contact the Construction Engineer to schedule the divers for the inspection. The inspection requirements are given in our Specifications and by plan notes. There are times when seal concrete is used with rock footings, spread footings, and pile footings for the purpose of sealing a cofferdam. In such cases structural footings would then be constructed on top of the seal concrete in the dry. When a rock or spread footing is to be constructed on top of the seal concrete, these footings should be doweled to the seal concrete. If not provided in the plans, details for this doweling should be obtained from the Construction Bureau since the doweling will be dependent on the type and size footing required.

b. **Pile Footings**

Pile footings are used in areas where foundation materials will not provide enough support for direct bearing footings or where scour protection is needed. These footings will normally utilize steel H-piles or pre-cast/pre-stressed concrete piles for their support.

The following requirements for the installation of piles will also apply to pile bents as well as pile footings.

The goal of the Pile Driving inspector should be to install the piles in their desired location, within allowable tolerances, to minimum penetration (or refusal if required by the plans), which will provide support for the structure without settlement. There are many variables, which should be considered in achieving this goal. Some of the variables are design loading, pile type and size, soil conditions (core borings), estimated and minimum tip requirements, pile driving hammers, pile groupings, and pile stick-out length during driving. These and other variables make it impossible for pile driving to be an exact science. Due to this fact, there is no substitute for engineering experience in pile driving. Good, sound engineering judgement must be exercised during driving operations. The Project Engineer should always be involved in pile driving operations and should never place an inexperienced inspector in charge of this work.

Pile Driving Hammers

All pile driving equipment, including the hammers, must be approved by the Bureau of Materials & Tests prior to use on the project. The contractor should provide, as soon as possible, the information required in Section 505 of the specifications.

Selection of the hammer should be based on the work to be accomplished, not on the equipment owned by the contractor. The contractor may have to rent equipment to suit the size and kind of piles to be driven and the existing soil conditions in order to obtain adequate penetration and bearing.

As a general rule, piles should be driven with the heaviest ram that can be used without damaging the pile. A hammer with a heavy ram and short stroke will do a better job of obtaining penetration while minimizing damage than a hammer with a light ram and long stroke with the same energy rating.

Hammer "kinds" include gravity (drop) hammers, air/steam hammers, diesel hammers and hydraulic hammers. Gravity hammers should not be used except by special permission. Diesel hammers have become most popular with contractors because of economics; however, those with relatively light ram weights may not achieve the desired results in some soil conditions irrespective of their "rated energy" level. They can only be used on concrete piles when the width or diameter of the pile is less than 20 inches.

Hammer "actions" include single acting, double acting and differential acting. Single acting hammers have a power force exerted to assist in raising the ram; the fall of the hammer is by gravity alone. Double acting hammers have a power assist in both directions with spent gases being exhausted with each stroke. Differential acting hammers operate as double acting hammers except that, through valving, a portion of the gases are re-circulated (rather than exhausted) to assist in the powered down-stroke. Double acting hammers operate at a faster blow rate than do single acting hammers. Differential acting hammers utilize heavy rams (comparable to single acting hammers) and operate at relatively fast blow rates (comparable to double acting hammers).

Hammer "types" include open types and closed types. On open type hammers, the top of hammer is open where the ram will be exposed during driving. On these type hammers, the height of fall of the ram will vary depending mainly on the driving resistance of the pile; therefore, the height of fall must be recorded and multiplied by the weight of the ram to determine the driving energy. On closed type hammers, the ram will not be exposed and the length of stroke will be supposedly constant; therefore, the energy delivered to the pile will be a function of bounce chamber pressure. Consequently, bounce chamber pressure must be monitored as described in the specifications.

Some hammers have adjustable fuel pump settings by which the stroke and energy of the hammer can be varied. The purposes of these variable controls are to permit initially setting a pile without risk of damage (i.e., tension cracking in concrete piles) and to permit cutting back the energy of the hammer in hard driving situations to protect the hammer and pile from damage. When wave equation analysis is performed on a driving system with adjustable settings, specific guidance as to the use of these settings will be noted in the information received from the Bureau of Materials and Tests. The inspector must insure that these guidelines are followed.

Protection of Piles

Piling should be carefully handled at all times to prevent damage. Pile Driving Leads must be designed to hold the pile in proper position during driving while at the same time allowing freedom of movement of the pile and hammer during installation. Pile caps (driving heads) must be designed to fit both the hammer and the pile being installed to prevent damaging the pile. Pile cushions should be

installed on concrete piles, as shown on the approved Pile and Driving Equipment Data Forms, between the driving head and pile to prevent local damage near the upper end of the pile. The driving force of the hammer must be applied in line with the longitudinal axis of the pile and evenly across the end section to prevent damage. Where piles are being driven through very soft and unstable material, such as muck, care should be taken not to apply hard driving forces until some resistance is obtained at the pile tip. Hard driving which would drive the pile away from the hammer may cause concrete piles to crack and make them unacceptable. Specific guidelines for driving through soft material may be included with the hammer approval and the graph of pile capacity versus blow count, submitted to the Division Construction Engineer by the Bureau of Materials and Tests. The Project Engineer should insure that the contractor follows these guidelines during pile installation. Care should be taken not to overdrive steel piles once the tips reach or penetrate a hard stratum. Overdriving may cause the tips to split and/or the upper portion to be unduly damaged.

When concrete piles are driven with pre-stressed strand extending out of the top of the pile, the driving system (pile cap and cushion) must be designed to protect the strands from damage. If these strands are damaged a repair procedure must be submitted to the Construction Engineer for approval.

Penetration of Piles

Piles must be driven to sufficient depth to provide adequate bearing. The pile tips must also be placed to a depth where scour (erosion) will not present a future problem in rivers arid streams. Where minimum tip elevations are shown on the plans, the piles must be driven to that elevation first, and then consideration must be given to bearing capacity. Pile tips should never be left on a thin hard layer of rock or soil underlain by highly compressible soil. Such a situation will lead to long-time settlement of the piles under the design load.

Several aids are available to help with penetration problems. Pile points or shoes will assist in penetrating hard layers and at the same time protect the tips of the pile from damage. Spuds are sometimes used to break through thin rock layers prior to installing the piling. Pre-drilling (pilot holes) may also be used to assist in obtaining penetration. The use of short pile lengths (short stick-out above the ground) will also help in obtaining penetration. By utilizing short lengths, the driving energy will be better transmitted to the pile tips. Jetting will assist pile installation in sandy soils where penetration cannot be obtained by driving alone. If jetting is used, final bearing and penetration (last three to ten feet) should be obtained by driving without the use of jets.

Location of Piles

Piles should be driven within the specification tolerances at the location shown on the plans. Piles driven out of position will cause eccentric loading and will reduce the safety factor of the structure. Also, this may cause some piles to be overstressed. Fixed leads are the best assurance to hold piles in proper position during driving; however, most contractors use swinging leads. Where swinging leads are used, it is necessary that a rigid template (preferably steel members) be used at the ground or water line to guide the piles during driving. The template must be securely anchored in position. Where bearing is reached on a rock stratum, care should be taken to seat the piles on the rock without overdriving the piles. Overdriving will cause the piles to move out of position.

The inspector should check each pile driven to determine if it is within the specification tolerances. The results of these inspections should be recorded in the inspector's daily diary. If any piles do not meet these requirements an accurate drawing indicating the actual location of all out of tolerance

piles in a particular structure should be prepared and submitted to the Construction Engineer to determine if corrective procedures are necessary.

Determination of Adequate Bearing

Pilings obtain bearing in one of three ways: (1) End bearing- the entire load of the pile is supported by a firm stratum at the tip of the pile. (2) Skin friction - the load is supported by the friction developed between the surface of the pile and the soil through which it is driven, and (3) A combination of end bearing and skin friction.

Practically all of the piles driven in Alabama are either steel HP sections or pre-cast/pre-stressed concrete piles. Adequate bearing is determined in one of three ways: (1) by static load testing, (2) by dynamic load testing or (3) by driving to refusal on rock.

In general when the intent is to drive piles to refusal on rock, a note to that effect will be included on the plans.

Test piles are used to determine the required penetration and bearing of a group of piles in the same general area with generally the same soil conditions. The locations of the test piles and the bents each test pile will represent are normally indicated on the plans. If not, the Construction Engineer should be contacted for guidance on making these determinations.

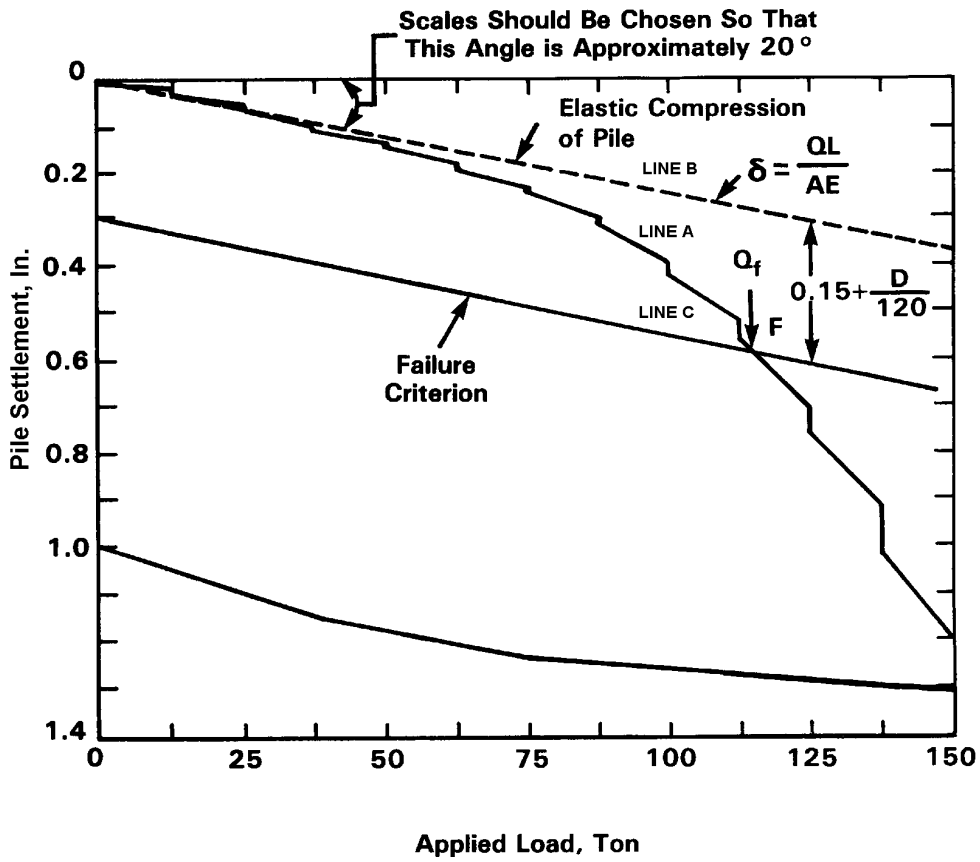
Driving of all test piles should be monitored by the Engineer or his/her inspector and the results recorded on **Form C-15A**, "Test Pile Record".

Test piles should be driven to an estimated hammer blow count, which corresponds to the capacity of twice the design load. This blow count will be determined by wave equation analysis. The Bureau of Materials and Tests will run a wave equation analysis on each pile driving hammer (and equipment) submitted by a contractor for approval. For each hammer and equipment approved they will submit a graph of pile capacity versus blow count to the Division Construction Engineer for distribution and use on the project. The required blow count for twice the design load can be obtained from this graph. After a test pile is acceptably driven to the required blow count, a static load test may be applied.

Dynamic load tests, when used, will be correlated to a static load test. The test pile for correlation will be dynamically monitored during driving, statically loaded, and correlated to a dynamic restrike within 48 hours of the quick load static test. When dynamic load tests are to be used, the Geotechnical Engineer in the Bureau of Materials and Tests should be notified at least seven days in advance of driving the test pile which is to be loaded. The Geotechnical Engineer will provide the necessary personnel and equipment for performing this test.

Where static load tests are to be used, the inspector should check the equipment and loading apparatus to assure that the required loads will be transmitted to the test piles. Also, acceptable methods must be used to determine the settlement of the pile under the imposed loads. All hydraulic jacks and gauges should be checked and tested prior to use. Each jack and gauge should be calibrated together and a calibration curve should be developed and used to determine the proper loads to be applied. Jacks that are not in good condition should not be used. Anchor piles for jacking frames should have enough penetration so there will be no movement (uplift) of the anchor pile during the test. The frame should be very rigid so there will be minimal deflecting and no bending of the frame.

Upon completion of a static quick load test, the data should be plotted as shown in the following graph, connecting data points with straight line segments (Line A). Calculate and plot QL/AE at the maximum load, then connect this point with a straight line (Line B) to graph origin where load and settlement equals zero. Calculate O.15+D/120, then draw a line (Line C) parallel to Line B offset this distance. The ultimate capacity of the tested pile, Q_f is equal to the load that corresponds to the intersection of line A and line C. If the value of Q_f equals or exceeds twice the design load the test passes. Otherwise the pile should be re-driven and loaded again in accordance with the specifications.



VARIABLES

Q = Maximum Load (kips)

Note: To convert from tons to kips multiply by 2.

L = Pile Length (in) from location of settlement instrumentation to bottom of pile.
A = Pile cross-sectional Area (sq. in)
E = Elastic Modulus of Pile Material (ksi)
D = pile Diameter (in) or Width (in)

The Elastic Modulus of pile material (E) should be determined as follows:

For Concrete Piling:

If the PDA is used to monitor the pile in question, the Modulus of Elasticity (E) will be provided by the operator of the PDA Otherwise, it should be calculated as follows:

$$E = 60{,}000\sqrt{f'_c}$$

f_c = Compressive Strength of pile concrete in psi
(5,000 psi unless noted otherwise on bridge plans)

For f_c = 5,000 psi:
$E = 60{,}000\sqrt{5000} = 4{,}242{,}640$ psi
$E = 4{,}242.6$ ksi

For Steel Piling:

Size	A (sq in)	D (in)	E {ksi)
HP 14x117	**34.4**	**14**	**29,000**
HP 14x102	**30.0**	**14**	**29,000**
HP 14x 89	**26.1**	**14**	**29,000**
HP 14x 73	**21.4**	**14**	**29,000**
HP 13x 73	**21.6**	**13**	**29,000**
HP 12x 74	**21.8**	**12**	**29,000**
HP 12x 53	**15.5**	**12**	**29,000**
HP 10x 57	**16.8**	**10**	**29,000**
HP 10x 42	**12.4**	**10**	**29,000**

Once the test piles are driven and tested, a determination may be made of the proposed pile lengths required for the structure. All piles should be driven to approximately the same penetration and driving resistance as proved to be satisfactory by the test pile. Driving resistance is recorded in " blows per foot" for all pile types.

The results of a static quick load test should be recorded on **Form C-15B**, "Pile Loading Record-Quick Load Test". As soon as a load test is finished, this form and the attached graph should be completed and submitted through proper channels to the Construction Engineer along with the Test Pile Record. The Bureau of Materials and Tests will use the information obtained from the load test to revise the bearing curves to provide a better estimation of bearing for a specific blow count. These revised curves will be submitted to the Division to be used for estimating the bearing of the production piles on **Form C-16**, "Driving Record of Piling". This will not require any delay in the driving of production piles. Upon completion of a passing load test, the driving of production piles to the proven blow count of the load test may begin. The estimated bearing for each production pile, as recorded in the last column of **Form C-16**, may be determined later upon receipt of the revised bearing curves.

Piles Placed in Seal Concrete

If a pile footing is being constructed inside a cofferdam and seal concrete must be poured to seal the cofferdam, then the piling will be cut off to the correct elevation after the seal concrete has been poured and the cofferdam de-watered. No dowels are needed where seal concrete is used with pile footings.

c. Drilled Shafts

A drilled shaft is a foundation that is constructed by placing steel reinforcement and fresh concrete in a drilled hole. This type of foundation is being used more frequently due to problems with driving piles to the deeper elevations required by scour projections and the economics involved in replacing a cofferdam with a drilled shaft.

During the excavation of a drilled shaft the contractor is required to maintain an excavation log. The project inspector should work closely with the contractor to insure that this record is kept accurately since it will be used as a basis of measurement for payment for the excavation. Careful attention should be paid to the type of material being excavated at a specific elevation and the type of equipment being used for the excavation process. All of this information will be extremely valuable if questions arise as to the adequacy of the shaft's design.

The inspector must insure that the contractor checks the dimensions and alignment of each shaft excavation. He/she also must insure that the bottom of the shaft is clean. If a shaft is to be poured in the dry, the depth of water on the bottom of the shaft prior to placing concrete must not exceed the allowable maximum depth given in the specifications.

During the placement of the reinforcing cage into a shaft, the inspector should insure that properly sized spacers are used as required in the specifications. If a shaft is constructed at varying diameters, the contractor should be required to use the properly sized spacer for each section of the shaft.

When a shaft is to be poured in the wet, the specifications require that Crosshole Sonic Logging (CSL) tubes be installed "in a regular, symmetric pattern such that each tube is equally spaced from the others around the perimeter of the cage" and that they be "as near to parallel as possible". For acceptable results from the CSL tests it is imperative that these placement patterns be maintained during the installation of the rebar cages into the shafts.

To insure the integrity of test results the inspector should carefully inspect the installation of sonic logging tubes with regards to the following items:

1. To the extent possible given the required placement of longitudinal and transverse steel in a reinforcing cage, sonic logging tubes should be symmetrically placed around the inside perimeter of the cage (plan arrangement) and parallel to the vertical centroid of the cage (profile alignment).

2. Individual logging tubes should be securely tied to the reinforcing cage at not more than five vertical foot intervals to insure correct plan arrangement and profile alignment. Tubes installed in cages less that 35 VF in length should be tied at the 1/5 points of the cage length.

3. Realizing that all completed cages "flex" to some extent as they are raised to the vertical position for insertion into an excavation, correct and secure placement of logging tubes must be checked as the cage is lowered into the excavation. The contractor should be required to retighten and/or add additional tie points as necessary.

4. Insist on the exercise of reasonable care to avoid dislodgment of installed logging tubes during and after concrete placement.

5. Insure that logging tubes are completely filled with clean water and capped prior to concrete placement.

6. Prior to pouring concrete in a slurry filled shaft excavation, the contractor must take slurry samples using a sampling tool similar to that shown in the following diagram.

SLURRY SAMPLER

The sampler consists of three components:

1. Cable with weighted cone-shaped stopper.

2. Cylindrical sampler center-stayed for alignment.
3. Top stopper with hole drilled through the center for slipping onto cable.

Sampling is accomplished by:

1. Lower cable with stopper to desired sampling elevation.

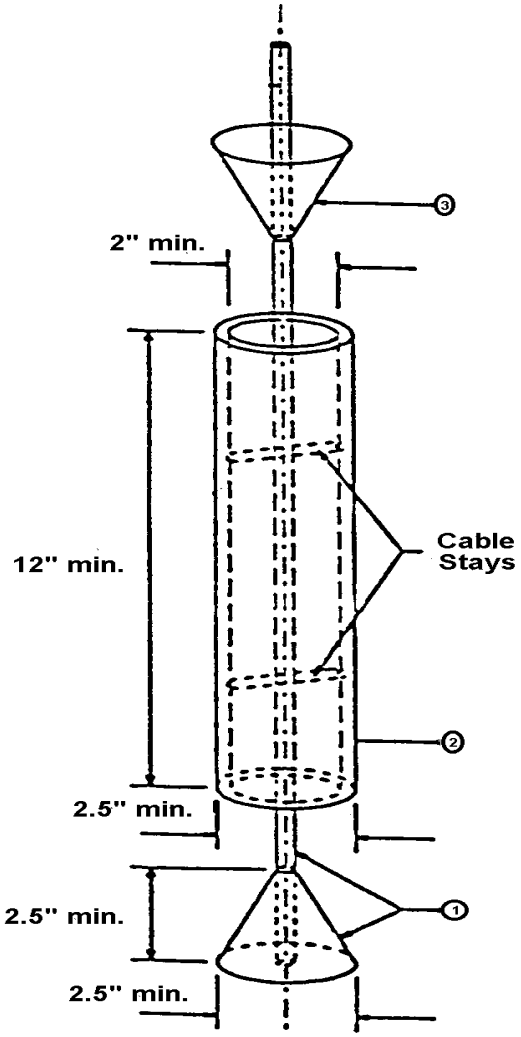
2. Slide cable through aligning guides of sampler.

3. Let sampler drop down the cable and seat onto bottom cone-shaped stopper.

4. Slide cable through hole in top stopper and let drop to seat on top of sample.

5. Withdraw entire assembly from shaft.

6. Sample may be emptied into separate container and used as necessary to perform required testing.



It will be necessary for project inspectors to monitor the concrete volume placed in any trial or production drilled shaft. It is important to confirm that cave-ins of the shaft walls have not occurred during the concrete placement particularly when placing tremie concrete or pumped concrete in slurry filled uncased holes. This can best be accomplished by careful monitoring of the concrete volume placed and the concrete level at frequent intervals so that actual concrete volume placed can be compared with the theoretical volume for the design shaft diameter.

Form C-35, "Drillled Shaft Pouring Record", is provided for this purpose and should be used for recording the necessary data and plotting the required graphs.

The inspector should graph the theoretical volume of excavation prior to the pouring of a shaft. The theoretical volume per linear foot can be determined from the following table for the appropriate shaft diameter:

Shaft Volumes

Shaft Diameter (in.)	***Volume per Linear Foot (cu. yd./L.F.)***
24	***0.12***
30	***0.18***
36	***0.26***
42	***0.36***
48	***0.47***
54	***0.59***
60	***0.73***
66	***0.88***
72	***1.05***
78	***1.23***
84	***1.43***
90	***1.64***
96	***1.86***
108	***2.36***
120	***2.91***
132	***3.52***
144	***4.19***

During concrete placement the elevation of the top of concrete should be determined after each truck is poured out. This information along with the other required data should be entered on the form at that time and plotted on the graph on the back of the form. Any large variance between the actual concrete volume and the theoretical volume implies possible problems such as necking or enlargement of the shaft and should be investigated to determine the cause.

The bottom tremie elevation should also be checked and recorded at the same time as the shaft elevations to insure that it is immersed at least five feet in the concrete at all times. Maintaining the five feet (minimum) immersion is critical in preventing formation of an unwanted "cold joint" in the structural part of the shaft.

Immediately after the completion of pouring a shaft the top of shaft and the reinforcing steel should be checked to determine if it is located within the required tolerances given in the specifications. Reference points provided by the contractor's engineering personnel should be used in making these

checks. If the reinforcing steel is found to be out of tolerance, efforts should be made by the contractor to move it within tolerance provided the time limitations for concrete placement have not expired and steel coverage requirements are maintained. If it is necessary to move the reinforcing steel after completing the pour it should be noted on the Drilled Shaft Pouring Record for that particular shaft.

The results of these inspections should be recorded in the inspector's daily diary. If any shafts or rebar cages do not meet these requirements an accurate drawing indicating the actual location of the shafts and rebar cages should be prepared and submitted to the Construction Engineer to determine if corrective procedures are necessary.

Currently two types of load test devices are being utilized by the Department for load testing drilled shafts; Osterburg Load Cells and Statnamic Load Tests. If load tests are required a special provision will be included in the contract to indicate the type of test and to provide the necessary requirements. When these tests are required personnel from the Bureau of Materials and Tests will aid project personnel in monitoring the tests.

2:6:A:1.2 BRIDGE ABUTMENTS

An abutment is located at the beginning and end of each bridge and consists basically of a footing, a cap, two wingwalls and a backwall. Since a large portion of our bridge maintenance problems are located at the abutments, their correct location and construction cannot be overemphasized.

The abutment cap will be stepped, have concrete pedestals under each bearing, or a combination of the two in order for the bearings to be placed to their correct elevations and to help prevent water from collecting around them. These pedestals should always be constructed with a space between the pedestals and the abutment backwall as shown on the plans.

The placement of bearing anchor bolts is covered in our Specifications and the Project Engineer and Inspector should be familiar with this. Special attention should be given to anchor bolt wells (holes) cast into the abutment cap. Considerable damage to the cap can result from allowing water to freeze in these wells. The Contractor should cover these wells, fill them with antifreeze, or do whatever is necessary to insure that the cap is protected during the winter months.

Where the backwall is extended from the cap to the roadway finish grade, the bridge expansion is between the backwall and end of the bridge deck. If the backwall is not poured vertical, along the correct skew, or if the forms are allowed to bulge, then the bridge will not have the proper clearance needed for expansion. The Contractor should, therefore, utilize good forms and forming technique and the Project Engineer and Inspector should make the Contractor aware of any problems they foresee.

2:6:A:1.3 BRIDGE BENTS OR PIERS

A bent is the intermediate support for a bridge and is referred to as a pier when it is constructed in water and, sometimes, even when it is near water.

Bents are usually classified as one of the following three types:

1. Reinforced Concrete Bent.

This type bent is constructed in place and consists of reinforced concrete footings, either direct

bearing, pile, drilled shaft, or a combination of these, with reinforced concrete columns and caps.

After the footings have been constructed in accordance with the plans and specifications, the columns can be constructed. Metal forms are normally utilized because wood forms have a tendency to bulge when high lifts are poured. Whatever forming method the contractor proposes to use should be acceptable to the Engineer. If the method is not acceptable, the Engineer should require forming details be submitted in accordance with the specifications.

The bent caps are similar to the abutment caps; therefore, the construction requirements for the abutment caps are applicable. The contractor's method of supporting the bent cap forms may vary slightly but they are normally supported by the columns with tie-bolts through the columns or friction collars around the columns. The support for the bent cap is considered as falsework. The contractor should submit working drawings and calculations for distribution in accordance with the specifications.

2. <u>Pile Bent</u>.

This type bent will generally consist of steel H-piles, pre-cast/pre-stressed concrete piles, or drilled shafts. The cap will be either poured in place reinforced concrete or pre-cast concrete.

When steel H-piles are used, the piling will either be encased with reinforced concrete or braced to other piling in the bent by means of sway bracing. The purpose of sway bracing is to give the piling lateral support and will only be required when the bent reaches a certain height. This height is dependent on the size of the H-pile and will, therefore, be shown on the plans or indicated on standard drawings.

The piling should be driven to the tolerances required by the specifications. At no time should the piling be forced into alignment and held there until the sway bracing is connected or the cap poured. This will cause internal stresses that the bent is not designed for and could, cause the bent to fail over a period of time. The piling should be free standing when the sway bracing is connected and when the cap is poured. No pulling on the bent should ever be allowed once the sway bracing or cap is in place.

The pre-cast/pre-stressed concrete pile bents do not require sway bracing or encasements but the piling must be stored and handled with much more care than the steel H-piles in order to keep from cracking them. If a pre-stressed concrete pile is cracked during storing, handling, or driving, a decision must be made whether to accept or reject the piling. The decision should be based on the location and severity of the cracking. The Division Construction Engineer and the Construction Bureau should be involved if this problem arises.

The caps that are normally used for pile bents are cast in place reinforced concrete caps similar to those for the reinforced concrete bents. Pre-cast concrete caps are normally only used with steel H-piles. When they are used, steel plates are cast into the caps and the caps are welded to the steel H-piles in the field.

3. <u>Pre-cast, Post-tensioned Box Bents.</u>

This type bent normally consists of reinforced concrete footings, either direct bearing, pile, drilled shaft or combination of these, with pre-cast box sections that are post-tensioned together to form the column. The anchorage for the pre-cast box sections is cast in with the footing. The first pre-cast box section is then placed on top of the footing and each remaining section is set into place on top of the previously set section until the column is completed The sections are post-tensioned together as erection continues.

The caps for this type bent can be poured in place reinforced concrete or pre-cast concrete and then post-tensioned to the box sections.

The correct casting of the box sections is critical in order to achieve the required alignment of the bent. The casting will determine whether or not this type bent is successfully constructed and acceptable.

2:6:B: BRIDGE STRUCTURES (SUPERSTRUCTURE)

2:6:B:1.1 BRIDGE BEARINGS

The bearings connect the superstructure to the substructure and provide for the expansion and contraction of the bridge. They must be set correctly in order for the bridge to expand and contract properly. The Contractor should, therefore, be extremely careful when setting the bearings and making the appropriate temperature adjustments.

The main three types of bearings used are Bronze Bearing Assemblies, Rocker Bearings, and Elastomeric Bearings.

Bronze Bearing Assemblies

This type of bearing assembly is made up of a structural steel top plate, a self-lubricating bronze plate, and a structural steel masonry plate. On grades over 3%, a beveled plate is provided over the top plate to help compensate for the grade.

The uppermost plate of the assembly is connected to the girder for both the expansion and fixed assemblies.

The masonry plate is the bottom plate of the assembly and is connected to the cap of the abutment or bent for both the expansion and fixed assemblies.

The self-lubricating bronze plate is between the top plate and the masonry plate. The bronze plate has a series of holes, which are packed with grease just prior to assembly of the bearing. This provides the lubrication requirements needed during the life of the bearing.

The top of the bronze plate is curved to allow for rotation due to loading conditions and the bridge grades. The bottom of the bronze plate slides on the masonry plate as the temperature of the superstructure changes to allow for expansion and contraction. The bronze plate is pinned to the masonry plate on fixed assemblies in order to prevent movement.

Steel straps, which connect the steel plate to the masonry plate, are for shipping and handling purposes only. Just prior to steel or pre-cast concrete girders being placed on the bearings, the straps should be cut and the top plate should be rotated to fit the grade. If the concrete girders are cast-in-place, then the straps should not be cut until after the girders have been poured.

Another bearing assembly, often used in lieu of the bronze bearing assembly, utilizes a steel plate with a PTFE (Polytetrafluoroethylene) layer on top and bottom of the plate. This plate replaces the bronze plate with the remainder of the assembly the same as the bronze bearing assembly. The PTFE bearing assembly relies on the self-lubricating ability of the PTFE material for movement during rotation, expansion and contraction.

Rocker Bearings.

This type bearing is normally used when the bronze bearing assemblies are too small to carry the load and expansion. However, there are a few small rocker assemblies used on short spans if they are more economical than the bronze bearing assemblies.

The rocker bearing is composed of structural steel and consists of a top assembly, a bottom assembly, and a masonry plate. The top assembly is fixed to the girder and the masonry plate is fixed to the abutment or bent cap.

On expansion bearings the bottom assembly is connected to the top assembly with a stainless steel pin which allows rotation. The bottom of the bottom assembly is curved, also allowing rotation, and sits directly on the masonry plate.

On fixed bearings the bottom assembly is fixed to the masonry plate and the stainless steel pin is fixed to the bottom assemblies in order to prevent any movement during expansion and contraction. The top plate can still rotate to adjust for grades and loading conditions.

Elastomeric Bearings.

1. Type 1 and Type 2

These bearings consist of a plain elastomer or a laminated elastomer (having another material such as sheet steel cast integral with the elastomer). Movement during expansion and contraction is provided in the deflection of the elastomer portion of the bearing and is allowed by a properly sized slot in the clip angle that attaches to the girder. A temperature adjustment is required during installation for this type bearing. This adjustment should be made by placing the anchor bolt in the anchor bolt well at the proper location (relative to the slot in the clip angle) based on the temperature of the girder at the time the bolt is installed. The anchor bolt should be installed only after the girders and the bearings have been properly placed.

These bearings are normally used with concrete girders but have also been used on short spans with steel girders.

2. Type 4 and Type 5

These bearings consist of a laminated elastomer vulcanized to a structural steel bearing plate. Movement during expansion and contraction is relative to an anchor bolt and is allowed by a properly sized slot in the bearing plate. A temperature adjustment is required during installation for this type bearing. This adjustment should be made by placing the anchor bolt in the anchor bolt well at the proper location (relative to the slot in the bearing plate) based on the temperature of the girder at the time the bolt is installed. The anchor bolt should be installed only after the girders and the bearings have been properly placed.

Temperature Adjustment.

The best time to set or check the position of the bearings is at first light (dawn) while the superstructure is at uniform temperature throughout.

On bronze bearing assemblies or rocker bearings, the bronze plate or pin, whichever the case, should be centered over the masonry plate at 70°F. On Type 1 or 2 elastomeric bearings the anchor bolt should be centered in the slot of the clip angle at 70°F. On Type 4 or 5 elastomeric bearings the anchor bolt should be centered in the slot of the bearing plate at 70°F. At temperatures other than 70°F., the location of the center of the bronze plate or pin relative to the masonry plate (or the location of the center of the anchor bolt relative to the slot for elastomeric bearings) is calculated as follows:

Temperature greater than 70°F.:

D = 0.000006 (T-70) (L)
Move bronze plate or pin away from fixed point (or move anchor bolt away from fixed point relative to the center of slot for elastomeric bearings).

Temperature less than 70°F.:

D = 0.000006 (70-T) (L)
Move bronze plate or pin toward fixed point (or move anchor bolt toward fixed point relative to the center of slot for elastomeric bearings).

D = distance in feet to move center of bronze plate or pin from center of masonry plate (or distance in feet to move anchor bolt from center of slot for elastomeric bearings).
T = temperature of the steel or concrete beam or girder.
L = distance in feet from the bearing being set to the fixed bearing.*

*** Note: On some bridges, the superstructure may be fixed at both main piers. In this case the point of fixity will be half-span between the two fixed bearings.**

2:6:B:1.2 BRIDGE BEAMS OR GIRDERS

The words beams and girders are used interchangeably when referring to bridges. They are designed to carry the different loads applied to the superstructure and transfer these loads through the bearings to the substructure. The beams are usually made of structural steel, pre-tensioned/pre-stressed concrete or cast-in-place reinforced concrete.

There have been some pre-tensioned/pre-stressed concrete beams utilized, which were cast monolithic with the bridge deck. There have also been some pre-cast/post-tensioned reinforced concrete box sections utilized in Segmental Construction. Since both of these are used very little and their design and construction methods are unique to their particular project, they will not be covered in this manual.

a. Structural Steel Beams

These beams are used on both simple and continuous spans and can be wide flange beams, welded plate girders or a combination of the two. A wide flange beam is rolled into its shape by the steel manufacturer. A welded plate girder consists of a top flange plate; a bottom flange plate and center web plate furnished by a manufacturer and then welded together by a fabricator to form a beam. Welded plate girders provide a great flexibility in design because they allow a variety of span lengths to be utilized.

Proper erection techniques of steel beams are essential in order to keep from inducing any internal stresses into the beams that they are not designed to carry. Since erection plans are not normally required on simple spans, the Project Engineer should assure himself/herself that the Contractor's method of erection would not damage the beams. Normally beams up to and including 50 feet in length are lifted with one pick up point. Beams over 50 feet in length are normally lifted with two pick up points, i.e., two cranes with one pick up point each or one crane with a spreader beam that provides two pick up points.

On continuous spans erection plans are required and the Project Engineer and Inspector should be familiar with the plans and require the Contractor to follow them. If the Contractor requests to deviate from the erection plans, then the Division Construction Engineer and the Construction Bureau should be consulted before the Contractor is allowed to proceed.

When erecting steel beams, the diaphragms should be placed as erection proceeds in order to stabilize the beams. The diaphragms should be held in place with erection bolts until all beams for the span have been erected, graded and all splices torqued. The diaphragms can then be bolted in their final position. The bolts should be tensioned in accordance with the specifications.

The Project Engineer and Inspector should be completely aware of what areas of the beam flanges are in tension since no welding is allowed on a tension flange. On simple spans the top flange of the beam is always in compression and the bottom flange is in tension. On continuous spans, the tension and compression areas will be shown on the plans.

When using high strength fasteners, rotational-capacity tests must be performed on each combination of both production lots, nut lot and washer lot prior to using any of the fasteners. Thereafter a minimum of one rotational-capacity test must be performed prior to beginning the tensioning operation each day.

b. <u>Pre-tensioned/Pre-stressed Concrete Beams</u>

These beams are usually AASHTO Types I, II, III, IV, BT54, BT63 or BT72 and are used on spans ranging from 34 feet to 140 feet long.

No erection plans are required for these beams since they are erected as simple span members and their lifting hooks are cast into the concrete.

If any cracks are noticed in the beams upon arriving on the job site or after erection, the Division Construction Engineer and the Construction Bureau should be advised in order to determine if any corrective actions should be taken.

Web walls may be poured and allowed to set up prior to the deck concrete being poured as indicated in the specifications.

c. <u>Cast-In-Place Concrete Beams</u>

These beams are used for both simple and continuous spans. They are formed and poured in the field and, depending on the plan requirement may be poured either monolithic with or prior to the deck concrete being poured. The Contractor must utilize good forming techniques to successfully construct these beams.

These beams are seldom used because of the money and time normally saved when using Pre-tensioned/Pre-stressed Concrete girders.

2:6:B:1.3 <u>BRIDGE DECK</u>

A bridge deck normally consists of cast-in-place reinforced concrete.

Improper deck construction will probably only initially be present in the appearance and riding surface of the bridge. The long-term effect will be premature deck deterioration and, therefore, high maintenance costs. Some of the main factors that can cause premature deck deterioration are:

1. Insufficient Concrete Strength, i.e., too much water in the concrete, concrete allowed to segregate or improper curing of concrete.

2. Improper Concrete Placement, i.e., moving concrete with vibrator, laying vibrator on steel reinforcement or rate of pour too slow allowing concrete to begin to take a set.

3. Insufficient Concrete Cover Over Steel Reinforcement, i.e., screed set improperly, grades figured incorrectly and minimum slab thickness not maintained.

The contractor should utilize good forming methods and construction techniques to satisfactorily construct a bridge deck. The Project Engineer and Inspector should insure that the contractor's forms and forming methods are in accordance with their working drawings.

Before the contractor sets his/her forms, the beams or girders must be profiled so that the forms can be set for the correct slab depth. After the profiles have been taken, they should be plotted on cross section paper using a large scale. The plan profiles should also be plotted so that a comparison can be made between the actual field condition and the plan grade.

At this point, the actual camber should be closely checked to see if it is within allowable construction tolerances. There are no specific construction tolerances concerning camber in our specifications; however, excessive camber causing the beam or girder to extend into the bottom of the theoretical slab cannot be tolerated. On the other hand, if all the camber called for on the plans is not put into the girder, the girder will sag below proper grade after the deck is poured. If the Project Engineer feels that the camber is not tolerable, he/she should immediately see that the Construction Bureau is notified so that the proper corrections can be made.

After the beams or girders are determined to be within camber tolerance, the contractor can form the bridge deck. During forming the slab thickness between beams or girders should be maintained constant by varying the fillet depth along each member.

When installing permanent metal forms, welding is normally required. Since there is no welding allowed to the tension flange of a steel girder, beam, stringer, etc., the contractor should use a method of connecting the support angles that will prevent welding in these areas. Normally, the contractor will use a metal strap that will span the width of the top flange and the welded connection is then made to the strap instead of the flange. When this is done a backing plate of galvanized steel must be placed below the strap in accordance with the specifications to prevent the welds from penetrating through the strap into the top flange of girder. The welds are typically one to two inches long and the straps are spaced 12 to 15 inches apart. Where straps are not used the welds are still normally 12 to15 inches apart. If any welding is done in the tension flange of a steel girder, the Construction Engineer should be notified.

When placing the steel reinforcement, the contractor should utilize approved supports. These supports are specified in the Specifications but if metal supports are used, they may deform during the placement of the steel reinforcement. They should be replaced as necessary before the deck concrete is poured.

The placement of the steel reinforcement should be carefully checked to insure the correct size and amount is placed, that proper spacing is maintained between the bars and the bars are adequately

and firmly tied. The spacing can be spot checked with a ruler and visually inspected instead of actually measuring every bar that is placed.

When using permanent metal deck forms the slab thickness, bottom steel reinforcement clearance, etc., are measured to the top corrugation of the form. If the bottom steel reinforcement were placed by measuring from the bottom corrugations the proper concrete cover would not be attained at the top corrugations. The same holds true for the proper slab thickness. Therefore, it is essential that measurements be made to the top corrugation.

Once the steel reinforcement is in place, the contractor must place the screed supports or headers in order for the concrete cover and slab thickness to be checked. When using a longitudinal screed, transverse headers will be set for the screed to run on. When using a transverse screed, longitudinal rails or supports will be set up outside the overhang for the screed to run on.

After the screed is in place and set with the appropriate camber, a trial run should be made over the deck. During this trial run, the distance from the top mat of the steel reinforcement to the bottom of the screed should be measured and recorded. This distance should be equal to the required concrete cover shown on the plans less the deflection expected in the beams or girders due to the weight of the concrete for longitudinal screeds. This distance should be equal to the required concrete cover shown on the plans for transverse screeds. The required concrete cover should, therefore, be present once the beams have deflected. The slab thickness should also be measured and recorded during the trial run in the same manner used to check the clearance on the top mat of steel reinforcement. These measurements should be taken in each bay (midway between each girder) at the following locations: each end, the quarter points and the center of the pour.

Once the concrete has been placed and screeded, the actual concrete cover over the top mat of steel reinforcement and the actual slab thickness should be measured and recorded. The slab thickness may vary by + 1/4 inch as long as the surface tolerance of 1/8 inch in ten feet is maintained. These measurements should be taken in two bays at the following locations as a minimum: each end and the center of the pour. Any variations greater than those previously mentioned will require that additional checks be made. The contractor should provide a work bridge as required in the specifications for taking these measurements.

The final finish is then applied and it is obtained by either wood floating or burlap drag. The curing should begin immediately behind this finishing operation. Plastic shrinkage cracks and other problems that can be detrimental to the deck can occur if the curing is delayed.

The straight edging of the deck concrete, as specified in the Standard Specifications, should be performed in conjunction with the initial finish or immediately thereafter. This should allow time to correct any areas not meeting specification tolerances.

The final texture will be obtained by cutting/sawing transverse grooves into the deck after it has been cured in accordance with the Specification unless otherwise shown on the plans.

Grooving the bridge deck after the concrete has been cured requires special equipment designed especially for grooving hardened concrete. Because of the differences that are present with the equipment manufacturers, the contractor should discuss his/her equipment and procedure at the pre-pour conference. The following are adjustments that can be allowed during the grooving operation:

1. The location of the first groove at an open joint can be spaced from two to eight inches away from the back edge of the embedded armor plate or expansion dam.

2. If the equipment is not capable of grooving the deck continuously from one side of the bridge to the other to within two feet of the barrier rails or curbs, then a location has to be determined for the grooves to be discontinued and the machine turned. On normal crown bridges this can be done at the center of a pavement stripe. The ends of the grooves should be located consistently apart not to exceed two inches. This is normally performed at the centerline pavement stripe. On single lane bridges or multilane bridges that will not have a centerline pavement stripe, this can be performed at the shoulder stripe or at another lane edge pavement stripe.

3. On horizontally curved bridges the grooves should be spaced appropriately on the inside of the curve and will fan as they are continued to the outside of the curve. This should also be discussed at the pre-pour conference and the contractor should make every effort to keep the fanned portion to a minimum spacing.

4. On bridges that have skewed open joints, "stair stepping" will be allowed at the joints since the grooves will not be running parallel with the joint. This is a triangular section of the deck that will not be grooved because of the skew. The maximum width to be grooved in one pass should be limited to two feet.

Check list For Bridge Deck Construction

The following checklist should be used by the Project Engineer to insure that the construction of the bridge decks are properly inspected:

Pre-Pour Preparation:

1. Insure that contractor profiles the girders and checks the camber prior to setting the deck forms.

2. For steel girders and diaphragms, inspect all high strength bolts to insure that they were properly installed and tensioned.

3. Working drawings with design calculations must be on file for all falsework for deck and overhang. Distribution stamp from the Construction Engineer required except for Class 1 falsework previously submitted and distributed. [See Subarticle 501.03(j).]
Insure that all forms are installed in accordance with the appropriate drawings.

4. Insure that all forms are mortar tight.

5. If stay-in-place forms are to be used, Bridge General Note (BGN) Note 27 must be on the plans.

a. Check to insure that all stay-in-place materials meet all material requirements. [See Subitem 501.03(i)3b

b. On precast concrete girders, the form supports should be cast into the girders in accordance with the approved shop drawings.

c. On steel girders, the form supports should be attached as shown on the falsework drawings. However, no welding should be allowed to areas of the girder which are in tension. [See Subitem 501.03(i)3b.]

d. Stay-in-place form sheets must be securely fastened to form supports with a minimum bearing length of one inch at each end. Spacing of fasteners should be in accordance with the falsework drawings.

e. Transverse construction joints should be located at the bottom of a flute in the stay-in-place forms, where possible, with 3/8" holes drilled at no more than 12" apart.

f. All form welds should be cleaned of slag and wire brushed just prior to placing of the deckconcrete.

6. An approved job mix formula must be on file in the project office prior to pouring the deck.

7. On simple spans, construction joints should be located as required in the specifications unless approved otherwise by the Construction Engineer. [See Subitem 510.03(c)6b.]

8. Vertical construction joints must be formed with substantial bulkheads or headers capable of supporting the weight of the wet concrete.

9. Material certificates must be on file for all reinforcing steel used in the deck. Heat numbers on the reinforcing steel should be checked against the numbers on the certificates.

10. Steel reinforcement should be properly maintained during storage on the project. [See Subarticle 508.03(c).]

11. Steel reinforcement should be inspected carefully for proper placement in the deck with regard to the plans for size, spacing and clearances.

12. All reinforcement must be rigidly wired (or spot-welded, if approved by the Construction Engineer) and properly supported in position. [See Item 502.03(c)4.]

13. All splices of reinforcement should be checked for proper overlap of bars. [See Item 502.03(d)1.]

14. Deck drains should be checked to insure that their location is in accordance with details shown on the plans.

15. A chamfer strip must be located on the overhang forms to provide a continuous "V" groove as required in Subitem 510.03(c)6g.

16. All edges and corners of forms at angles of 90 degrees or less must be chamfered and filleted unless otherwise shown on the plans. [See Paragraph 501.03(i)3a(2)]

17. All expansion joint devices and expansion joint openings should be checked to insure that they are set correctly prior to pouring the concrete adjacent to the joint. [See Subitem 510.03(c)6h.]

18. If grounding is required by the plans, each exterior girder of bridges or portions of the bridges using steel girders shall be made electrically continuous in accordance with the requirements given in Item 510.03(c)8.

19. A pre-pour conference must be held between the contractor and the Project Engineer prior to placing any bridge deck concrete. As a minimum, the following questions should be addressed with full documentation provided in the project diary:

a. What rate of placement will be maintained?

b. How many workers will be available for the pour?

c. What type of screed will be used?

d. How will the concrete be delivered to the forms? [Lift bucket, pump, etc.]

e. How many vibrators and generating plants are available?

f. If the weather turns cold, how will the concrete be protected?

g. If rain occurs before initial set occurs, how will the concrete be protected?

h. Are the materials and equipment necessary for f. and g. above available on the job site?

i. What method and type of finishing will be utilized?

j. What method and type of curing will be utilized?

k. How many work bridges will be available for use during the pour?

20. When a transverse screed is used check the following items:

a. The screed must be supported by vertically adjustable rails set a sufficient distance from the gutter line to allow free movement of the screed from gutter line to gutter line.

b. Supports for the screed rail must be spaced a maximum of 18" center to center with slab overhang support brackets spaced a maximum of 24" center to center unless shown otherwise on the working drawings.

c. The contractor should set the grade on the screed rails to account for the deadload deflection and provide the required final profile grade.

d. The screed rails must be completely in place for the full length of the pour.

21. When a longitudinal screed is used check the following items:

a. The screed must be supported at the ends by a transverse header and/or by a section of previously poured deck.

b. If the deck being poured is on a super-elevated section, the screed must be operated from the low side to the high side.

22. After the screed is in place and the proper camber set, a trial run shall be made over the full width and length of the deck during which the contractor should check all aspects of the screed and supports for proper adjustment.

23. After this check, the screed shall be run again to allow the Engineer to take and record measurements [See Subitem 510.03(c)6c] as follows:

a. The slab thickness in each bay (midway between girders) at each end, the quarter points and the center of the pour.

b. The steel clearances on the top mat of steel reinforcement in the same locations as for "a" above.

24. Prior to placing concrete all sawdust, chips and other construction debris and extraneous matter shall be removed from the interior of the forms.

Concrete Placement:

1. The inspector should sample and test the concrete in accordance with the Department's Testing Manual.

2. Concrete test specimens should be placed in the protected environment provided by the contractor in accordance with Subarticle 501.02(d).

3. If web-walls are to be poured and allowed to set up prior to pouring the bridge deck as allowed in Subitem 510.03(c)6b., extra cylinders should be made if the contractor desires a break prior to seven days.

4. During the placement of the concrete, the contractor shall continuously check the alignment of the side forms, overhang forms and headers. Any yielding of the forms or falsework shall be corrected immediately.

5. Vibrators shall be manipulated, so as to thoroughly work the concrete around the reinforcement and into the corners and angles of the forms. However, vibrators shall not be used to make concrete flow in the forms over distances so great as to cause segregation. [See Subitem 501.03(e)1c.]

6. The rate of placement of the concrete should be monitored to insure that all concrete between construction joints is placed and compacted in a continuous operation before initial set takes place. [In case of breakdown or other suspension of placement prior to completion see Subitem 510.03(c)6b.]

7. Once the concrete has been placed and screeded, the actual concrete cover over the top mat of steel reinforcement and the actual slab thickness should be measured and recorded. [See Paragraph 7 page 21 of 27.]

8. The deck should be straight edged in conjunction with the final finish or immediately thereafter. All deficient areas should be marked and corrected by approved methods. [See Subitem 510.03(c)6d.]

Curing of Deck Concrete:

1. The Engineer should ascertain if the proposed equipment supplied by the contractor for determining the evaporation rate has been approved by the Materials and Tests Engineer.

2. Prior to pouring a bridge deck slab (and during the pour if it takes more than two hours), the evaporation rate must be determined by the project inspector. If the rate exceeds 0.2 pounds per square foot per hour the contractor must take the necessary action to reduce the rate if they wish to proceed with the pour in order to reduce the risk of plastic shrinkage cracks. [See Subitem 501.03(k)2a.]

3. Immediately after the final pass of the screed on any section of the slab exceeding five feet, the evaporation control curing operation must begin. [See Subitem 501.03(k)2b.]

4. If fogging is the chosen method of evaporation control the inspector should insure that it is maintained until the moist curing after finishing is begun.

5. If an evaporation barrier material is the chosen method of evaporation control the inspector should insure that it is applied under pressure at a rate of one gallon to not more than 200 square feet of surface area.

6. The inspector should insure that the chosen method of final curing is applied immediately after the finishing operation is completed and maintained in a satisfactory condition for the required curing period of seven days. [See Subitem 501.03(k)2c.]

7. No traffic or other superimposed load should be permitted over the bridge deck until the concrete has reached a minimum compressive strength of (4000 psi) from test cylinders. [See Item 501.03(k)3.]

2:6:B:1.4 BRIDGE RAILING

The solid barrier rails are the standard bridge rail presently being used by the Department. These rails have 3/4-inch open joints provided in them at locations shown on the plans. These joints are required so that the rails will not act as continuous beams and become load-carrying members.

a. Pre-cast Barrier Rails

Pre-cast barrier rails used on bridges are normally only used on the secondary system with the short span pre-cast bridges. These rails are usually pre-cast by the same fabricator that cast the other bridge members and they are bolted in place in the field.

b. Cast In Place Barrier Rails

Some contractors will form the barriers and cast them in place. The forms are usually metal and are supported from the bridge deck. The contractor's method of anchoring the forms is his/her choice as long as it is acceptable to the Engineer. Small threaded metal inserts are allowed for use by the contractor to anchor his/her forms. These inserts are drilled into the bridge deck and are grouted flush with the top of the deck once the forms are removed.

c. Slip Formed Barrier Rails

Slip forming barrier rails is another method of casting the barrier rails in place. This method allows the contractor to form, pour the barriers and remove the forms in one operation. The forms are attached to a slip-forming machine and the machine travels the length of the bridge, constructing the barriers as it proceeds. A contractor utilizing this method must assure himself/herself that the steel reinforcement details, etc. shown on the plans do not have to be altered for his/her particular slip form machine. If alterations are required, then the Project Engineer should be given this information and he/she should forward it to the Division Construction Engineer and Construction Bureau for approval. When the slip forming method is used the open joints shall be sawed in the proper locations to a minimum of 5/16 of an inch in width. It is critical that this operation be performed in a timely manner to prevent uncontrolled shrinkage cracking. The guidelines provided in the specifications should be used in determining the proper timing of this operation. If shrinkage cracking does occur the contractor should be required to submit a procedure for sealing the cracks. This procedure should be submitted to the Construction Engineer (through the proper channels) for approval.

On Cast-In-Place and Slip Formed Barrier Rails, curing compounds should be applied to the barrier rails as soon as possible after the forms are removed. A coated finish, if used by the contractor, should not be applied until adequate time, as directed by the Specifications, has elapsed since the curing compound was applied. The Project Engineer should always see that the coated finish is applied in accordance with the Specifications and the manufacturer's recommendations.

Curing of the pre-cast barrier rails is covered in the Specifications.

CONSTRUCTION MANUAL

BUREAU OF CONSTRUCTION

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1.1 ALDOT Organization

ORGANIZATION OF THE ALABAMA DEPARTMENT OF TRANSPORTATION

The Alabama Department of Transportation serves the public through its Central Office located in Montgomery, the Division/Region Offices located in various geographical regions of the state, the District Offices located within the division/region boundaries, and Project Offices located within districts and dedicated to specific construction projects.

CENTRAL OFFICE

The administrative leaders of ALDOT are assigned to the Administrative Bureau located in the ALDOT Central Office. This bureau is organized into the Office of the Transportation Director and the Office of the Chief Engineer / Deputy Director. Bureaus and Divisions/Regions report to the Transportation Director either directly or through the Chief Engineer.

The Transportation Director is the Chief Executive Officer of the Transportation Department. All powers, authority, and duties vested in the Transportation Department are exercised by the Transportation Director. Four bureaus report directly to the Transportation Director: Legal, Personnel & Compliance, Finance & Audits, and Air Transportation.

The Office of the Chief Engineer / Deputy Director has supervision over four Assistant Chief Engineers (Administration, Policy & Planning, Pre-Construction, and Operations), all Divisions and Regions, and fifteen Bureaus (Communications & Community Relations, Aeronautics, Training & EDP, Research & Development, Computer Services, Transportation Planning & Modal Programs, Office Engineer, County Transportation, Bridge, Design, Right of Way, Equipment, Construction, Maintenance, and Materials & Tests).

Each bureau has a Bureau Chief with several assistants under their supervision to carry out the activities of the bureau. The Bureau Chief reports directly to the appropriate Assistant Chief Engineer. Personnel within the bureaus work on a statewide basis and offer assistance to the Divisions/Regions in their area of expertise.

CONSTRUCTION BUREAU

The Construction Bureau is lead by the State Construction Engineer who reports to the Chief Engineer through the Assistant Chief Engineer of Operations. Organization of the Construction Bureau includes six sections: Road Construction, Bridge Construction, Environment and Technology, Specifications, Plans Review, and Special Projects.

This bureau is responsible for providing support and guidance to division/region construction personnel and for general administration of all construction contracts. A goal of the Construction Bureau is to promote uniformity and consistency in the interpretation, enforcement, and implementation of contract document requirements and internal policies related to construction.

DIVISION/REGION OFFICE

The state is presently divided into seven Divisions and one Region. The plan is to transition all Divisions into Regions. Each Division/Region Office is organized similarly to the Central Office. Within each Division/Region Office, a Division/Region Engineer supervises several Assistant Division/Region Engineers responsible for Construction, Maintenance, Pre-Construction, County Transportation, Materials, Equipment Operations, and Right of Way. The Division/Region Engineer is responsible to the Chief Engineer through the Assistant Chief Engineer of Operations. The main function of the Division/Region Office is to carry out the work of ALDOT and supervise work by the District Offices in a particular division/region. Technical expertise as well as contract administration support is available from each of the Central Office Bureaus through the Construction Bureau.

DISTRICT OFFICE

Each Division/Region contains several District Offices varying in number according to the size of the division/region and population density of urbanized areas. Each District Office has a District Manager, who may supervise several assistants in directing both maintenance and construction activities within their district. The District Manager directs the activities of several maintenance crews and may have a number of Project Managers under their direct supervision varying with the number of projects underway in their district. In some exceptional cases, the District Manager may be relieved of their responsibility for construction activities in which case the Project Manager will come under the direct supervision of the Division/Region Construction Engineer.

PROJECT OFFICES

Project Managers and their assistants are responsible for field administration of construction contract documents on specific construction projects. They oversee Contractor operations to ensure conformance to the plans, specifications, and special provisions. Project office personnel are supported by the District, Division/Region, and Central Offices as needed.

1.2 Personnel

CONSTRUCTION PROJECT OFFICE PERSONNEL

The Division/Region Construction Engineer is responsible for initially staffing project offices. Selection of project personnel may vary widely depending on type of construction and rate of contractor progress. These factors determine the number of project personnel required and their type and level of skills. During construction, the Project Manager is responsible for monitoring and anticipating project office staffing needs. Consideration should be given to current staffing levels and expected increases or decreases in workload. The Project Manager should notify and update the Division/Region Construction Engineer of the quantity and skill level of project staffing required for satisfactory contract management. Changes to project office staffing will be made at the direction of the Division/Region Construction Engineer with input from the Division/Region Engineer and District Managers. The Division/Region Construction Engineer is responsible for ensuring the adequacy of division/region construction staffing levels by monitoring and anticipating staffing needs. Consideration should be given to current staffing levels and expected increases or decreases in workload.

Project office personnel include a Project Manager and an inspection staff. Additional personnel may include assistant project managers, chief inspectors, dedicated stormwater inspectors, traffic control inspectors, surveying, and office support staff.

PROJECT MANAGER

The Project Manager serves as the direct supervisor of all personnel assigned to their project office, the field representative of ALDOT as the “Engineer” referenced by contract specifications, and often the initial contact for public and stakeholder comments and inquiries. The Project Manager ensures project personnel adhere to all applicable ALDOT policies and guidelines. The Project Manager is responsible for direct communication with division/region construction leadership and the contractor. The Project Manager is responsible for administration of the contract including documentation of project activities, contractor compensation for work completed in accordance with contract documents, and verification of both quantity and quality. The Project Manager is responsible for awareness of all of ALDOT construction responsibilities and commitments to the contractor, the public, and applicable government regulatory agencies.

The Project Manager title carries with it a high level of responsibility and expectation. How the Project Manager conducts business and communicates with stakeholders can have a direct affect on ALDOT operations in both positive and negative forms. ALDOT leadership expects the Project Manager to perform and conduct themselves professionally at all times. Personal accountability and improvement should be a priority of the Project Manager for themselves as well as the personnel that they supervise.

PROJECT INSPECTORS

Project Inspectors serve as agents of the Project Manager, communicating and documenting the quality and quantity of work completed by the contractor. Quantity and quality of work items are assessed for payment through observation, direct measurement, sampling, and testing which shall be conducted in accordance with contract requirements, ALDOT policies and procedures, and completed training. Construction inspection training is available to increase the knowledge base of the inspector and to fulfill requirements of ALDOT policies regarding the inspection duties associated with particular types of construction. The Project Inspector is held personally accountable for work that they perform. Inspector documentation of personnel and contractor activities as well as verbal communication of activities shall be accurate, thorough, and complete at all times. Project Inspector communications with contractor personnel shall always be professional.

Project Inspectors are often the initial contact for public and stakeholder comments and inquiries related to the project. Project Inspectors are expected to handle all such encounters professionally as they provide contact information for the Project Manager.

1.3 Equipment

PROJECT OFFICE EQUIPMENT

The project office will be furnished with the quantity and type of equipment and supplies required to carry out the responsibilities of the project office staff. The Project Manager is responsible for notifying appropriate district or division/region personnel of current and future equipment and supply needs. The request for and receipt and transfer of equipment shall be in accordance with applicable ALDOT policies and directives of the division/region equipment manager. Required documentation of equipment transfers may include Form E-18B – Property Transfer Report, which may be found in the Comprehensive Equipment Management System (CEMS). The ALDOT Equipment Manual and division/region or district equipment managers can provide additional information.

Project personnel may be assigned furniture, hand tools, computers, surveying equipment, sampling and testing equipment, and vehicles. General policies regarding vehicle usage is provided below and may be supplemented by division/region specific policies and directives. Care for equipment is the responsibility of the user. Users will be held accountable for the whereabouts, condition, and cause of condition of any equipment or supplies assigned or used. Equipment and supplies shall be used and cared for in accordance with recommendations of the manufacturer and in a manner that ensures that ALDOT receives the full and expected benefit from the purchase of the equipment or supplies. In no case should ALDOT employees use ALDOT owned equipment or supplies for personal use.

LOST, STOLEN, OR DAMAGED EQUIPMENT

Should equipment be lost, stolen, or damaged the ALDOT Equipment Manual section IX "Disposal of State Owned Equipment and Supplies" and division/region policies should be referenced and procedures followed.

ALDOT OWNED VEHICLES

In no case should ALDOT employees use ALDOT owned vehicles for personal use.

Vehicular maintenance for ALDOT's rental fleet of equipment should be in accordance with the ALDOT Equipment Manual "Form E-2 Work Request and Discrepancy Report".

Information regarding vehicular accidents can be found in the ALDOT Equipment Manual section XIII "Accident Reports".

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2.5 Construction Stormwater

CONSTRUCTION BEST MANAGEMENT PRACTICES PLAN (CBMPP)

General

The ALDOT CBMPP is a document created and maintained for every ALDOT construction project that requires construction stormwater permit coverage under the Alabama Department of Environmental Management (ADEM) National Pollutant Discharge Elimination System (NPDES) Construction General Permit. The CBMPP is also a means to gather and communicate other environmental concerns, commitments, and contract requirements to ALDOT design and construction personnel as well as the Contractor. The CBMPP is a place to document environmental compliance including site inspections, rainfall amounts, and erosion and sediment control plan modifications. For Priority Construction Sites, the CBMPP will also contain the sampling data collected during turbidity monitoring.

For projects permitted by the Contractor, the CBMPP shall be prepared by the Contractor Qualified Credentialed Professional (QCP) using an ADEM approved format. The Contractor's CBMPP shall include the same concerns, commitments, and contract requirements made as part of the preliminary CBMPP provided by ALDOT and satisfy all of the requirements of the ADEM regulations.

A Priority Construction Site is a construction project that discharges to a waterbody which is listed on the most recently EPA approved 303(d) list of impaired waters for turbidity, siltation, or sedimentation, any waterbody for which a TMDL has been finalized or approved by EPA for turbidity, siltation, or sedimentation, any waterbody assigned the Outstanding Alabama Water, Outstanding National Resource Water, or Treasured Alabama Lakes use classification in accordance with ADEM Administrative Code, or any waterbody assigned another special designation in accordance with ADEM Administrative Code. If a project is a Priority Construction Site it will be noted in the CBMPP by the designer.

Design Component

The design component of the ALDOT CBMPP is created and updated during the planning and design phase by ALDOT, and/or consultant design personnel. The Design QCP certifies the design component of the CBMPP as having addressed all known environmental concerns, and that these concerns have been addressed in the project design.

The design component consists of three main sections: Project Information, Environmental Concerns and Commitments, and Environmental Best Management Practices (BMPs). The Project Information section compiles the ADEM Notice of Intent (NOI) and project quadrangle map, properties of the soil expected to be encountered, and hydraulic information including the anticipated rainfall conditions and the minimum design storm for temporary BMPs. The Environmental Concerns and Commitments section compiles information regarding construction stormwater along with other environmental issues such as wetlands, priority waters, threatened and endangered species, historical and archaeological sites, and hazardous materials. The Environmental BMPs section compiles standard information from the ALDOT Construction Manual, ALDOT Specifications, ALDOT Standard and Special Drawings, and project specific information.

ALDOT construction staff, including proposed construction project staff, should become involved in the design process as early and as often as possible to provide input relevant to BMPs. This should include onsite walk through meetings and preliminary design review meetings. Existing conditions and potential environmental concerns should be documented in writing, with photographs and/or video, and included with the project files. The Construction Bureau Environmental Construction Section will review the plans for projects that are Priority Construction Sites and those projects with 20 acres or more of disturbance for the limits of exposed erodible material. During the Prebid

Meeting (if one is held) and the Onsite Stormwater Meeting, the Region/Area Stormwater Coordinator is responsible for discussing the design component of the CBMPP and requirements of the contract related to environmental protection and communicating all known environmental concerns related to the project.

Operational Component

The operational component of the CBMPP is created and updated during the construction phase by ALDOT project personnel and contractor personnel. The Operational QCP (also known as the Project QCP), which is typically the Region/Area Stormwater Coordinator, certifies that the design component will be adhered to as closely as possible, and that the operational component will be created, updated, and adhered to during construction of the project.

The operational component consists of five sections: Contractor Submitted Components, ALDOT Inspection Reports, Rainfall Journal, Regulatory Actions Log, and CBMPP Modifications Log. The contractor submitted components are the Contractor's Stormwater Management Plan and any other environmental correspondence between ALDOT and the Contractor. The ALDOT Inspection Reports section has an ALDOT QCP CBMPP Evaluation Log and the completed stormwater inspection reports including any required turbidity sampling data. The Rainfall Journal section includes a chart of the locations of all rain gauges and any RainWave precipitation monitoring points and a monthly printout of the rainfall journal from the CPMS StormWater Tracking System (SWTS) database. The Regulatory Actions Log includes a chart of all actions by environmental regulatory agencies and all corresponding documentation. The CBMPP Modifications Log includes a chart of all CBMPP modifications and corresponding documentation.

During the Onsite Stormwater Meeting, the Region/Area Stormwater Coordinator is responsible for communicating the requirements of the operational component of the CBMPP to Region/Area Construction staff, ALDOT project staff, Contractor representatives, and any Subcontractors responsible for clearing, earthwork, vegetation establishment, or erosion and sediment control. Others at the meeting may include environmental stakeholders including representatives of ADEM, U. S. Army Corps of Engineers, U. S. Fish and Wildlife, and others if deemed necessary or if required by an environmental commitment. The discussion should cover scheduling and implementation of BMPs and other measures that will be taken to ensure and document environmental compliance with the ADEM Construction General Permit and all other environmental commitments. All of the Stormwater Discharge Points should be visited and discussed. For Priority Construction Sites, turbidity monitoring and construction stormwater sampling shall also be discussed.

ALDOT CONTRACTOR'S STORMWATER MANAGEMENT PLAN (SWMP)

A completed SWMP is required for all projects regardless of the type of work, funding, or regulatory permitting. *For Contractor permitted projects, the SWMP is not required if all of the information is included as part of the Contractor's CBMPP.* The Contractor is required to use the current version of the SWMP template without any modifications to the format of the document in order to be considered complete. The Contractor's SWMP should be submitted to the Region/Area Stormwater Coordinator, or to the County Engineer for County projects, prior to the Preconstruction Conference and Onsite Stormwater Meeting. The information contained within the SWMP shall be project specific, address all known environmental concerns and commitments, and explain how requirements of the contract documents regarding water quality protection will be met by the Contractor. The Construction Bureau will review the SWMP prior to approval if requested by the Region/Area. The SWMP must be sent for Construction Bureau review if the project includes Roadway Pipe Rehabilitation or Bridge Cleaning, or if the Contractor requests

a stream or waterbody encroachment or onsite storage of fuels/chemicals. Once the SWMP is accepted it will be added to the CBMPP and work may commence.

CONSTRUCTION STORMWATER INSPECTIONS

Construction Stormwater Inspection Forms

Detailed field conditions, observations, and other information regarding the QCI site inspections are documented in the SWTS on Form C-34, the Stormwater Inspection Report and BMP Certification. Sediment Loss and Turbid Discharge field conditions require that additional information about the noncompliance be documented in the SWTS on Form C-37, the Stormwater Noncompliance Notification Report. Form C-34a is a listing of the Stormwater Discharge and Background Points printed from the SWTS. Any errors found on the C-34a will be reported to the Region/Area Stormwater Coordinator immediately so that a request for corrections can be sent to the Stormwater Permit Coordinator. Turbidity monitoring results from construction stormwater sampling shall be documented in the SWTS on Form C-38, the Stormwater Turbidity Sampling Report.

Stormwater Discharge and Background Points

The location of the Stormwater discharge and background points are selected by the Designer and entered into the Project Data Form in CPMS. For Priority Construction Sites, these points are potential locations for construction stormwater turbidity sampling. These points will be located and identified on the Erosion and Sediment Control sheets of the plans as follows. Graphical examples of point identification are located in the appendix of this manual. Additional stormwater points may be added by the Region/Area Stormwater Coordinator as needed or as requested by ADEM.

Primary Stormwater Discharge Points shall be identified by an integer that represents the contributing drainage area followed by a zero in the decimal place (example 25.0). These points are locations at which channelized construction stormwater discharge or a water of the state leaves the ALDOT ROW. These points shall be identified in the field by a wooden stake notating the identification number.

Secondary Stormwater Discharge Points shall be identified by an integer, which is the same as the associated Primary Stormwater Discharge Point, followed by a letter in the decimal place (example 25.A). These points are locations within the ALDOT ROW where channelized construction stormwater discharge enters into a water of the State.

Background Points shall be identified by an integer, which is the same as the associated Primary Stormwater Discharge Point, followed by a non-zero number in the decimal place (example 25.1). These points are locations at which channelized stormwater flow or a water of the state enters the ALDOT ROW.

Field Conditions

Site observations, inspections, and evaluations are conducted on a periodic basis to assess the field conditions of each individual drainage area. This begins prior to beginning work on the project and continues until the project is accepted for maintenance. The findings will fall into one of the four following categories:

Satisfactory – The condition of the drainage area does not need any repairs or improvements. There is no substantial visible contrast observed at any stormwater discharge point. There is no visible evidence of substantial erosion or sediment loss. All BMPs applicable to the current phase of construction have been

properly installed or applied, have been maintained and repaired as needed, and are effectively functioning as intended. Sediment may have accumulated immediately upstream of one or more BMPs but it has not exceeded 1/3 the height or capacity of the BMPs. Any previously reported sediment deposits off site or in a water of the state have been remediated.

Needs Improvement – The condition of the drainage area needs minor repair or improvement. There is no substantial visible contrast observed at any stormwater discharge point. There is no visible evidence of off-site sediment loss. Minor erosion and on-site sediment loss may be observed. BMPs applicable to the current phase of construction may have not all been installed or applied or this may have been done improperly. BMPs may need repair or replacement. BMPs that have been properly installed or applied may not be effectively functioning as intended and need modification. Sediment may have accumulated immediately upstream of one or more BMPs and it may have exceeded 1/3 the height or capacity of the BMPs. Any previously reported sediment deposits off site or in a water of the state have not been remediated.

Turbid Discharge – The condition of the drainage area needs repair or improvement. Turbid discharge occurs when turbid construction stormwater leaves the ALDOT ROW and may be observed as a substantial visible contrast at one or more stormwater discharge points. Turbid discharge also occurs when turbid construction stormwater causes an increase of more than 50 NTU in the turbidity level of a water of the state.

Sediment Loss – The condition of the drainage area needs major repair or improvement. Sediment loss occurs when sediment or soil is transported from the project and is deposited in a location off the ALDOT ROW or within a water of the state.

QCI Daily Observations

The ALDOT Project Qualified Credentialed Inspector (QCI) and the Contractor's QCI shall perform individual daily observations of each drainage area and its Stormwater Discharge Points and BMPs where the ground is disturbed. They shall also record rainfall measurements and weather information. Documentation of observations will be noted in the Daily Work Report. If a previously undocumented Needs Improvement, Turbid Discharge, or Sediment Loss condition is observed, then a formal site inspection and report is required.

QCI Site Inspections

Site inspections will not be conducted outside of normal operating hours or during unsafe weather conditions. The ALDOT Project QCI together with the Contractor's QCI will perform a formal site inspection for the entire project after the accumulation of ¾ inch of rainfall that occurs within 24 hours and at least once per week. Inspections triggered by a rain event shall be initiated as soon as possible and within 24 hours of resuming work on the project. The inspection will include an observation of each drainage area and its Stormwater Discharge Points and BMPs. All areas of the project not undergoing active construction will be evaluated for temporary stabilization requirements.

During the inspections that follow a ¾ inch or more rain event, turbidity monitoring will be conducted on Priority Construction Sites disturbing 10 acres or more of erodible material. The turbidity monitoring portion of the inspection will be conducted as soon as possible. During regular weekly inspections, turbidity monitoring will be conducted if a substantial visible contrast is observed at one or more Stormwater Discharge Points.

Documentation on the C-34 should include field conditions and corrective actions required or completed. Stormwater Inspection Report and BMP Certifications and any Stormwater Noncompliance Notification Reports will

be entered into the SWTS. Photographic documentation of inspections is required. At least one photograph per inspection will be uploaded to the SWTS with a clear description of the location. Reports will be closed within 48 hours of the qualifying rain event. Once a report is closed, the Project QCP will receive an email letting them know it is ready for their review and approval. The reports will be reviewed and approved no later than 5 days after the qualifying rain event. Once a report is approved, the Project QCP prints a copy, signs it, and obtains the second approval signature from the Responsible Official, typically the Area Operations Engineer. Signed inspection reports will be included in the CBMPP at the project office and a copy will be delivered to the Contractor QCI within 15 days of the qualifying rain event. An automatic notification is sent by the SWTS to ADEM, the Construction Bureau, the Office of Environmental Compliance, and the Area Operations Engineer for all approved inspection reports that have cited field conditions other than Satisfactory.

For projects with permits held by the Contractor or an LPA, the reports shall be written using ADEM's Form 23 11/11 or Form 25 11/11 (if applicable) by the Permittee's QCI. Formal inspections shall be reported to ADEM by the Permittee in accordance with permit requirements. Copies of all draft reports shall be provided to the Engineer no later than 24 hours after the inspection, and copies of signed reports shall be submitted to the Engineer no later than 5 days after the inspection.

If a Needs Improvement field condition is observed, then this information will be immediately communicated to the ALDOT Project Manager and Contractor. The Project Manager shall work with the Contractor to create a plan for immediate corrective actions, which shall be completed prior to the next storm event but no later than 5 days after the inspection unless prevented by unsafe weather conditions. This corrective action may require a suspension of all other operations. Additional inspections will be performed as needed until the observed deficiency can be documented as corrected, satisfactory, and in compliance with the ADEM permit.

If a Turbid Discharge or Sediment Loss field condition is observed, then this information shall be immediately communicated to the Project QCP, the ALDOT Project Manager, and the Contractor. A Turbid Discharge or Sediment Loss condition requires a verbal notification by the Project QCP to the ADEM Field Office within 24 hours of the event and the submission of a written Stormwater Noncompliance Notification Report within 5 days of the event. The verbal notification requirement for Turbid Discharge conditions may be waived if written approval is given by the ADEM Field Office. The 24-hour notification will include the permit number, county, emergency contact information, and the period of the Turbid Discharge or Sediment Loss condition. The Project QCP will confirm the duration and frequency of any rain event of 2-year intensity or greater associated with a Turbid Discharge or Sediment Loss condition. The rain event information (for example a 2-year 24-hour rain event) will also be included in the noncompliance notification. The ALDOT Project Manager will work directly with the Project QCI and the Contractor to gather additional data. The Project Manager will inform the Project QCP of the details regarding the noncompliance. The Project QCP shall be the point of contact for any discussions with the Responsible Official, Region/Area Stormwater Coordinator, property owners, environmental groups, or regulatory agencies. The Region/Area Stormwater Coordinator will determine if additional consultation should be sought from the Construction Bureau. The Construction Bureau will determine if consultation should be sought from other bureaus within ALDOT or an independent QCP. The Project Manager and the Project QCP will work with the Contractor to create a plan and implement immediate corrective actions which shall be completed prior to the next storm event but no later than 5 days after the inspection unless prevented by unsafe weather conditions. This corrective action may require a suspension of all other operations. If permanent corrective measures cannot be implemented within the 5 day timeframe, then written notification and detailed explanation will be given to ADEM. Additional

inspections will be performed as needed until the observed deficiency can be documented as corrected, satisfactory, and in compliance with the ADEM permit.

QCP Site Evaluations

The Operational/Project QCP, will conduct a project inspection and CBMPP review a minimum of every six months. These evaluations will be documented on the ALDOT QCP CBMPP Evaluation Log. A copy of the inspection report and any associated correspondence will be added to the CBMPP.

ALDOT Central Office Reviews

Additional project inspections and CBMPP reviews will be conducted by the ALDOT Construction Bureau as needed. These reviews are intended to aide construction personnel in maintaining compliance with the ADEM permit.

TURBIDITY MONITORING

Turbidity monitoring is required on all Priority Construction Sites that disturb 10 or more acres of erodible material. The Environmental Concerns and Commitments section of the CBMPP will indicate if the project is a Priority Construction Site. A Project Note will be included in the plans indicating that turbidity monitoring is required and the applicable drainage areas if it is not required for the entire project.

Primary and Secondary Stormwater Discharge and Background Points are all potential locations for turbidity monitoring. Current regulations require that our construction stormwater discharges not increase the turbidity of the receiving water by more than 50 Nephelometric Turbidity Units (NTUs) or cause a substantial visible contrast. In order to document compliance with these requirements, the Permittee will conduct turbidity monitoring by sampling channelized construction stormwater discharges and measuring the NTUs with a portable turbidimeter.

The Permittee will conduct representative turbidity monitoring in each individual drainage area. Representative turbidity monitoring will be defined as sampling at the Primary Stormwater Discharge Point and every Background Point of a drainage area. The data from these points will allow the Permittee to determine whether the drainage area is in compliance with the 50 NTU above background limit. If a substantial visible contrast is observed at a Secondary Stormwater Discharge Point, an additional sample will be taken at that location. All results from turbidity monitoring will be recorded on the Stormwater Turbidity Sampling Report in the SWTS.

There are some instances when stormwater sample collection will be waived in a drainage area. When a required sample is not collected, it must be due to one of the following acceptable reasons and this will be recorded on the Stormwater Turbidity Sampling Report in the SWTS. In all cases photographic documentation is required.

Prior to Construction – Turbidity monitoring in a drainage area is encouraged but not required to commence until work has begun in that drainage area. This reason is also acceptable in cases where there is not channelized flow because the pipe or ditch at that sampling location has not been constructed.

Insufficient Flow – There must be sufficient channelized flow in order to collect a stormwater sample. In some cases there may not be sufficient flow until there is a considerable amount of precipitation. Sufficient channelized flow shall be defined as the ability to collect a sample of construction stormwater without the sample collection container touching the bottom of the conveyance (ex. ditch bottom, stream bed, pipe, etc.).

Hazardous Condition – There may be times when it is not possible to take a stormwater sample at a turbidity monitoring point due to a life-threatening hazardous condition. The details of the hazardous condition will be documented on the report.

Monitoring Suspended – Turbidity monitoring will continue in a drainage area until the final required stabilization is installed or applied, erosion is controlled to the maximum extent practicable, and stormwater sampling results have shown the drainage area to be in compliance for the last two months. If all of these requirements have been met, then turbidity monitoring may be suspended in a drainage area. However, if the project has not been accepted for maintenance, turbidity monitoring will resume if the drainage area is subsequently disturbed, there is evidence of substantial erosion, or a substantial visual contrast is observed at a primary or secondary discharge point.

SAMPLING PROCEDURE

Sampling of construction stormwater will be conducted for channelized flow at the nearest accessible location to the sampling point identified in the plans. Construction stormwater samples will be collected and analyzed by the Permittee using a portable turbidimeter provided by the Contractor. Prior to sampling, the QCI will read the turbidimeter user manual and be familiar with proper equipment operation and handling procedures. Results will be recorded on the Stormwater Turbidity Sampling Report in the SWTS.

Contractor Furnished Sample Analysis Equipment

Contractor retained turbidimeters will be used for analyzing construction stormwater samples. Approved turbidimeters are included on List II-24 "Temporary Erosion and Sediment Control Products". The Contractor shall provide documentation of professional equipment calibrations. The Contractor shall also provide a calibration kit (calibration standards, soft lint-free cloth, and silicone oil) and sample tubes from the turbidimeter manufacturer. The Permittee's QCI will ensure that the calibration standards are not expired. The Permittee's QCI will verify calibration and, if needed, calibrate the turbidimeters each day prior to sampling analysis.

Permittee Furnished Sample Collection Equipment

1. Sample Collection Containers – one pint minimum volume, polyethylene or glass, wide-mouth container, preferably with a lip designed for pouring
2. Sample Storage Containers – one pint minimum volume, polyethylene or glass, wide-mouth container, with a secure lid
3. Cleaning Brush(es)
4. Phosphate-Free Detergent
5. Distilled or Deionized Water – gallon jugs for use in the project office
6. Squirt Bottle – fill with distilled or deionized water for use in the field
7. Waterproof Labels – for labeling sample storage containers
8. Waterproof Ink Pens – for labeling sample storage containers

Equipment Cleaning

For accurate readings, sample tubes will be kept completely clean both inside and out. Sample tubes will be handled by the lid and will not be touched on the glass as much as possible. Scratched or etched sample tubes will be discarded and replaced. Do not reuse sample storage containers or sample tubes without proper cleaning. Sample collection containers, sample storage containers, and sample tubes will be washed after each day of use as follows:

1. Wash with a brush and phosphate-free detergent.
2. Rinse three times with cold tap water.
3. Rinse three times with distilled or deionized water.

Additionally for samples tubes, wipe the exterior with a soft, lint-free cloth. If there are minor imperfections in the glass, a light coating of silicone oil should be applied to the exterior surface and wiped with the cloth to create a thin, even film over the entire surface.

Sample Collection

Construction stormwater samples will be collected by grab samples from flowing channelized discharge. The sample will be collected from the center of the main flow of the discharge or stream or, if too deep or unsafe, as near to that location as possible. If you must stand in the water to take the sample, collect the sample upstream of you and any area that you disturb. Collect downstream samples in the drainage area first beginning with the Primary Stormwater Discharge Point, any required Secondary Stormwater Discharge Points, and ending with any Background Points.

Rinse the inside of the sample collection container in the water to be sampled prior to each sample collection. To collect a sample, hold the sample collection container near the base and turn it with the opening downward towards the water surface. Being sure not to touch the bottom of the conveyance, plunge the container into the water 8-12 inches beneath the surface or halfway down for shallower flows. Turn the container opening away from you and in an upstream direction to collect the sample.

Sample Analysis

The sample analysis will be conducted in the field immediately after sample collection. Place the turbidimeter on a level surface; do not hold it in your hand. Fill the sample tube by pouring from the collection container. Securely cap the sample tube and follow the turbidimeter manufacturer's operation instructions to determine the turbidity of the construction stormwater sample. Results will be recorded as follows:

NTU Range	Number of Decimal Places
0.0 to < 1.0	2
1 to < 10	1
≥ 10	0

Sample tubes may be reused in the field if they are rinsed with distilled water immediately after each analysis.

Samples Exceeding 1000 NTU

Construction stormwater samples that have readings exceeding 1000 NTU will be further analyzed in the project office. Each sample storage container will have a waterproof label with a record in waterproof ink of the project number, sampling point identification number, sample date, sample time, and the name of the QCI who collected the sample. Fill the sample storage container by pouring from the collection container. Transport the sample to the project office immediately for analysis. If analysis cannot be conducted within 15 minutes of the sample collection time, the sample must be cooled to 4°C [39.2°F] and can be held for up to 48 hours only.

Agitate the stormwater sample by repeatedly inverting the container to re-suspend any potentially settled particles. Using turbidity-free distilled water, dilute the sample until the reading is below 1000 NTU. Compute the turbidity of the original sample by multiplying the turbidity of the diluted sample by the dilution factor. For example, if 5 units of volume of dilution are added to 1 unit of volume of the sample, and the turbidity of the diluted sample is 500 NTU, then multiply 500 NTU reading by the total 6 units of volume to equal a 3000 NTU turbidity measurement for the original sample.

RAINFALL JOURNAL

Rain Gauges

Rain gauges will be utilized on all ALDOT construction sites. Rain gauges will be identified by the letter 'G' followed by an integer, which is the same as the associated Primary Stormwater Discharge Point of the drainage area in which it is located. Rain gauges will be located in an open area such that the measurement will not be influenced by outside factors such as overhangs, gutters, and trees. Rain gauges will be spaced approximately 3 miles apart. Daily rainfall amounts are rounded and reported to the nearest five hundredths (0.05") of an inch in the Rainfall Journal of the SWTS for each rain gauge. This is in addition to the weather and rainfall entry reported in SiteManager or CAMMS. The Rainfall Journal will be printed and added to the CBMPP at the end of each month.

RainWave Precipitation Monitoring

At least one RainWave Precipitation Monitoring point will be utilized for all projects designated as a Priority Construction Site or that have 20 or more acres of disturbance. The location of the RainWave points will be selected by the Construction Bureau. The Project QCP may request additional RainWave points. RainWave Precipitation Monitoring points will be identified by the letter 'R' followed by an integer, which is the same as the associated Primary Stormwater Discharge Point of the drainage area in which it is located. RainWave points will be located within the project limits and ALDOT ROW at a culvert site, bridge site, or other Primary Stormwater Discharge Point with potential environmental impact to a water of the state.

After the project has been let, the Construction Bureau will forward the RainWave Information Form to the Region/Area Stormwater Coordinator. After the project has been awarded, Region/Area Construction personnel will enter a Precipitation Monitoring Service type Request for Consultant (RFC) in CPMS for the RainWave service if one does not already exist. The RFC will be reviewed for approval by the Area Operations Engineer the Region Engineer, and the Chief Engineer, if applicable.

Upon final approval of the RFC, Region/Area Construction personnel will enter a Consultant Purchase Order (CPO) in CPMS. After the CPO is approved, the Region/Area will send a Notice to Proceed to the Consultant. This notification will include a copy of the CPO and the RainWave Information Form.

Automatic email notifications of daily precipitation totals and monthly precipitation summaries will be sent to the Project QCP, the Project Manager, and the Project QCI for entry into the Rainfall Journal of the SWTS. The names and email addresses of these individuals will be added to the RainWave Information Form by the Region/Area Stormwater Coordinator. The charge code for billing purposes and the monitoring end date will also be added. The estimated cost for the work should take into account the initial setup fee and the monthly fee for the proposed project time which can be automatically calculated by the previously utilized ALDOT Funds Transfer Request. One

month prior to the end of the precipitation monitoring contract each project, the Region/Area Stormwater Coordinator will receive an email with the option to extend the duration of the service.

STABILIZATION REQUIREMENTS

Temporary stabilization is necessary to minimize erosion of soils and transport of sediment. Temporary BMPs such as Stabilized Construction Entrances, Perimeter Sediment Barriers, and Sedimentation Basins shall be installed as soon as possible during the clearing and prior to beginning grading operations in the contributing drainage area. Additional Temporary BMPs shall be installed during grading to protect waters of the state, construction stormwater discharge points, construction stormwater inlets, and to divert stormwater flows around exposed work areas.

All exposed areas that are not undergoing active construction for a period of 7 days or more require temporary stabilization. Temporary Mulch shall be applied if the exposed area will remain inactive for less than 60 days. Temporary Seed and Temporary Mulch shall be applied if the exposed area will remain inactive for 60 days or more. Rolled and Hydraulic Erosion Control Products should not be used for temporary stabilization. Temporary erosion and sediment control BMPs should be removed, unless otherwise directed by the plans, as the final required stabilization is installed or applied in the drainage area and they are no longer serving their intended purpose.

Final or permanent stabilization is necessary to prevent erosion of soils and transport of sediment. Final stabilization should be continuously pursued by transitioning from temporary BMPs to permanent BMPs as grading advances while maintaining continuous erosion and sediment control. Final slope stabilization will be installed or applied in vertical increments that should not exceed 20 feet as grading progresses. Forms of final required stabilization includes, but is not limited to, permanent seed and mulch, permanent seed and an erosion control product, sod, aggregate surfacing, riprap plating, concrete, and asphalt.

Once the final required stabilization is installed or applied to an area the Contractor is allowed to expose an equivalent amount of acreage in another location. Additionally, any stormwater sampling locations in a drainage area which has final stabilization are eligible for evaluation for turbidity monitoring suspension. Once final required stabilization is in place on the entire project, vegetation is fully established, and the project is accepted for maintenance, the Permittee's QCP will request the coverage under the ADEM Construction General Permit be terminated. The Contractor is responsible for all erosion and sediment control until coverage under the ADEM Construction General Permit is terminated or 30 calendar days after submission of the termination request to ADEM, whichever occurs first. Required construction stormwater inspections by ALDOT personnel will cease according to the same terms.

QUALIFIED CREDENTIALED INSPECTOR TRAINING

All personnel responsible for construction stormwater inspections must be certified through an ADEM-approved initial 8-hour QCI training course. This applies to ALDOT, Contractor, Subcontractor, County, City, and ALDOT Consultant personnel. Additionally, all QCIs must participate annually in an ADEM-approved, 4-hour QCI refresher training course. The ALDOT Construction Bureau conducts an ADEM-approved QCI annual refresher training course available to ALDOT, County, City, and ALDOT Consultant personnel for recertification.

2.12 Contractor Compliance Requirements

CONTRACTOR LABOR REPORTS

The requirements noted hereinafter are applicable to Federal Aid projects; however, the Contractor should be advised that all projects are subject to investigation by the Department of Labor and that appropriate records should be maintained on all projects. It is the responsibility of the Project Manager to closely check each labor report assembly to determine that it contains all pertinent data and that it has been prepared in accordance with the labor compliance requirements. If errors are found, the Project Manager should initiate corrective actions to satisfactorily resolve the errors. The Division Office shall be furnished copies of all Contract Labor Reports and copies of any subsequent revisions or corrections.

Contractor Labor Reports shall be prepared and submitted by the Prime Contractor and all Subcontractors (including unapproved ones). The Contractor and all Subcontractors shall furnish each week at least two copies of their labor reports to the Project Manager within seven days after payment of wages. Required documentation for the Prime Contractor consists of their labor reports, Form AL 100 and Form AL 150, if applicable. Required documentation for the Subcontractor consists of their labor reports and Form AL 100 if they are active. The Prime Contractor's labor reports together with the Subcontractor's labor reports make up the weekly labor report assembly. It is the responsibility of the Prime Contractor to obtain the Subcontractor's reports so that the complete assembly may be submitted to the Project Manager.

Form AL 100, Statement of Wage Compliance, shall be executed by the Contractor or Subcontractor or by an authorized officer or member of the firm who supervises the payment of wages. The form certifies that all employees have been properly paid, that the attached payroll for the period is correct and complete, that any apprentices employed are duly registered in a bona fide apprenticeship program and that, where applicable, fringe benefits are paid in cash or to approved plans, funds or programs.

Form AL 150, Statement Required on Federal Aid Projects in the State of Alabama, shall be prepared and submitted by the Prime Contractor if they have an approved Subcontractor. The statement includes the name of Prime Contractor and the name of each approved Subcontractor and indicates if the Subcontractor(s) are "active" or "inactive".

Contractor Labor Reports must contain the following:

1. Correct project number.
2. Weekly payroll period ending date.
3. Employee's full name and last four digits of the Social Security number.
4. Employee’s job classification. If the employee has worked at more than one classification during the period, each classification must be shown. If it is necessary for a Contractor or Subcontractor to employ an individual to perform duties included in a classification not established in the contract, the Contractor or Subcontractor shall request that an additional classification and minimum wage rate be established to cover the additional duties.
5. Employee's daily and weekly hours worked in each job classification including applicable overtime hours worked in each job classification.
6. Employee's hourly wage rate or rates and, where applicable, their overtime hourly wage rate or rates. Special Provisions in the contract require that each laborer or mechanic be paid at least the minimum

wage rate established in the contract for their particular classification. The Work Hours Act of 1986 requires that each laborer or mechanic be paid for their overtime hours at a rate not less than one and one-half times their basic hourly rate of pay. All hours worked in excess of forty hours in a workweek must be paid at an overtime rate. If, for any reason, a Contractor is found in violation of the overtime requirement, liquidated damages must be calculated against the Contractor in the amount of $10.00 for each calendar day on which the affected employee was permitted to work the overtime.

7. Employee's itemized deductions. All deductions made must be either required (such as Social Security and Income Taxes) or must be authorized by the individual.
8. Employee's net wages paid. In all cases, the net amount indicated on the payroll must agree with the actual pay received by the employee.
9. Employee's ethnic group.
10. Employee's gender.

LABOR COMPLIANCE REVIEWS

It shall be the responsibility of the Project Manager to insure the Contractor and Subcontractors are in compliance with the contract labor provisions. The Project Manager shall make detailed labor compliance reviews in accordance with the following: If the project is of short duration, that is six months or less, at least one review is required; on all other projects at least two reviews are required and additional reviews may be directed. These reviews shall include the labor payrolls beginning with the basic time record and following through the canceled check, subcontract documents for inclusion of labor rates and other pertinent data, and interviews with employees with reference to payroll data and classification information. Statements made by employees in interviews, whether orally or in writing, shall be treated as confidential. The Project Manager shall furnish one copy of their labor compliance reviews to the Division Office.

In making the reviews, if the Project Manager finds any deficiencies in payments made to the Contractor's or a Subcontractor's employees, immediate action shall be taken as follows:

1. The Project Manager will notify the Contractor in writing of the error and will provide one copy of the letter to the Division Office. The letter will be held in suspense until full restitution has been made to the affected employee or employees.
2. The Contractor or Subcontractor involved shall prepare their Form AL 100, a supplemental payroll paying the employee the additional amount owed, and a letter of explanation as to how the error occurred, and corrective measures taken to prevent a reoccurrence. The Project Manager shall provide one copy of the supplemental payroll and letter to the Division Office.
3. The Division Office will maintain appropriate files for periodic review by representatives of the Federal Highway Administration.

2.14 Traffic Control Procedure

STATE OF ALABAMA DEPARTMENT OF TRANSPORTATION
TRAFFIC CONTROL THROUGH CONSTRUCTION WORK ZONES

INTRODUCTION

This document, known as the Procedure for Traffic Control through Construction Work Zones, is prepared in compliance with the U.S. Department of Transportation FAPG, 23 CFR 630 Subpart J, issued under the authority of 23 U.S.C. 105, 106, 109, 115, 315, 320, and 402(a), 23 CFR 1.32; 49CFR 1.48(b) and the federal Highway Safety Improvement Program, 23 U.S.C., sections 130, 144, 148, 152, and 409 and implementing regulations.

This Procedure may also serve as a guideline for use by the Department for other construction and maintenance activities.

Part VI of the Manual on Uniform Traffic Control Devices and associated supplements and handbooks such as ATSSA's Quality Guidelines for Temporary Traffic Control Devices sets forth basic principles and prescribe standards for the design, application, installation, and maintenance of the various types of traffic control devices for highway and street construction, maintenance operations, and utility work. These manuals are not intended to address in depth the variety of situations that occur in providing traffic control in work zones. Although those responsible for traffic control and work area protection have attempted to develop some guidelines and measures, a coordinated and comprehensive effort to develop greater uniformity is desirable. It is the intent of this document to provide these guidelines and assist in the MUTCD being properly implemented.

GFO 3-61 and GFO 3-65 are hereby referenced as additional guidance documents. GFO 3-61 provides guidance for the Department to follow for the purpose of safely and efficiently accommodating traffic through work zones. This GFO includes processes for use in developing a Transportation Management Plan, a Traffic Control Plan, a Traffic Operations component, and a Public Information component. The GFO further defines a Significant Project and the process to follow when developing the previously mentioned plans and components for Significant Projects. GFO 3-65 provides guidance for the Department to follow in order to decrease the likelihood of fatalities and injuries to workers and road users within the work zone. This GFO addresses the use of positive protection devices, exposure control/other traffic control measures, uniformed law enforcement officers, and addresses work vehicles entering and exiting traffic lanes.

DEFINITIONS

Wherever the following terms or abbreviations are used in the document, the intent and meaning shall be interpreted as follows:

AUTCR - Alabama Uniform Traffic Crash Report.

ATSSA - American Traffic Safety Services Association.

CARE - (Critical Analysis Reporting Environment) a system developed through the Center for Advanced Public Safety (CAPS) at the University of Alabama and used to access crash data, analyze crash statistics, and locate crashes to improve traffic safety statewide on all public roads.

CONTRACTOR - The individual, partnership, firm, corporation, or any acceptable combination thereof, contracting with the State for performance of prescribed work.

DEPARTMENT - Alabama Department of Transportation (ALDOT), as constituted under the laws of Alabama for administration of highway work.

DIRECTOR - The Chief Executive Officer of the Department as created by law, also referred to herein as Transportation Director.

DIVISION/REGION - An engineering organization of the Department in a geographical area of the State charged with all functions of the Department as related to its respective area.

DIVISION/REGION ENGINEER - The engineer in charge of a designated Division/Region of the Department.

DIVISION/REGION TRAFFIC ENGINEER - The engineer in charge of traffic operations in a designated Division/Region of the Department.

FAPG - Federal-Aid Policy Guide.

FHWA - Federal Highway Administration.

GFO - (Guideline for Operation) the policies and procedures under which the Department operates.

HIGHWAY SAFETY IMPROVEMENT PROGRAM - ALDOT Safety Program using Federal Safety Funds (Section 152) to identify high crash locations and develop counter measures for improvement using cost-benefit analysis procedures within budget limitations.

MUTCD - Manual on Uniform Traffic Control Devices for Streets and Highways, published by the U.S. Government Printing Office.

PROJECT - The specific section of the highway together with all appurtenances and construction to be performed thereon under the contract.

PM - (Project Manager) The personnel in charge of a designated project for the Department.

PTCI - (Project Traffic Control Inspector) The person designated to be responsible for reviewing traffic control devices on a particular project for the Department.

STATE - State of Alabama.

STATE CONSTRUCTION ENGINEER - The engineer in charge of general administration of the Department's contract construction work.

STATE DESIGN ENGINEER - The engineer in charge of establishing design policy and standards as well as overseeing the development of roadway plans for the Department.

STATE TRAFFIC OPERATIONS ENGINEER - The engineer in charge of traffic engineering, traffic control, and traffic control devices for the Department.

STATE SAFETY OPERATIONS ENGINEER - The engineer in charge of safety engineering, safety infrastructure elements, and highway safety evaluations for the Department.

TCP - (Traffic Control Plan) A plan that describes Temporary Traffic Control (TTC) measures to be used for handling traffic through a specific highway or street work zone or project.

TRANSPORTATION PLANNING and MODAL PROGRAMS BUREAU - The Bureau charged with administration of the Highway Safety Improvement Program pursuant to 23 U.S.C., Sections 130, 144, 148, 152 and 409 and implementing regulations.

WORK ZONE - An area of highway with construction, maintenance, or utility work activities.

WORK ZONE CRASH - A traffic crash in which the first harmful event occurs within the boundaries of a work zone or on an approach to or exit from a work zone, resulting from an activity, behavior, or control related to the movement of the traffic units through the work zone.

WORK ZONE IMPACTS - Work zone-induced deviations from the normal range of transportation systems safety and mobility. These impacts may extend beyond the physical location of the work zone itself and may occur on the roadway on which the work is being performed as well as other highway corridors.

IMPLEMENTATION

General

After a project is placed under contract, the Contractor may be permitted to develop a TCP to be used in lieu of the TCP provided in the construction plans. The Contractor's plan will be approved for use only if the Department and FHWA find that the Contractor's plan is as good as or better than the plan provided in the construction plans. The Contractor may also be permitted to offer a revision to only a portion of the existing TCP. To receive approval for changes to the TCP, the Contractor must submit a detailed alternate plan, or revision, to the Division/Region Engineer, through the Project Manager.

The Division/Region Engineer shall submit the proposed revisions, along with recommendations, to the State Construction Engineer for review and approval and further handling with FHWA.

The Contractor will not be permitted to implement any part of an alternate plan, or revision, until written approval has been given by the Department.

For proposed TCP revisions initiated by Department personnel, the PM shall submit the revision to the Division/Region Engineer. The Division/Region Engineer shall submit the revision, along with recommendations, to the State Construction Engineer for review and approval and further handling through FHWA.

The PM may approve minor TCP changes for immediate implementation as deemed necessary.

Project Traffic Control Inspector

Before work begins on a project, the PM shall designate, in writing, a qualified person to be responsible for reviewing the traffic control devices on the project. This person shall have received training as provided by the Training section of this Procedure and shall be known as the Project Traffic Control Inspector. The PTCI shall report to the PM and have the principal duty of keeping the PM informed of the adequacy and effectiveness of the traffic control devices on the project. The PM may serve as the PTCI.

All traffic control devices should be inspected prior to installation for compliance with plans and specifications. The PTCI shall inspect the installation of the devices and make regular inspections of the in-place traffic control devices to determine if they are being properly maintained (ALDOT Traffic Control Device Quality Guide). The PTCI shall document each inspection by completing, Form C-25, Daily Inspection of Traffic Control Devices. The PTCI shall also

perform periodic nighttime inspections to confirm that proper maintenance is being performed on the devices. These nighttime inspections shall also be documented on Form C-25. The Form C-25 shall be submitted to the PM for review.

The PM will be responsible for notifying the Contractor of any deficiencies and administering the contractual enforcement requirement. Dates of such notification and dates of corrective action by the Contractor should be noted on Form C-25.

Contractor Liability

This Procedure does not relieve the Contractor of the prime responsibility to continually inspect and maintain the traffic control items and to safely handle traffic through the work area. The Contractor is responsible for traffic safety on the project. The Department's responsibilities are limited to identifying acceptable control levels and taking measures to effectively enforce contract provisions. The Contractor's responsibilities shall not be relieved by the Department's failure to enforce any provision.

Assistance from Local Law Enforcement Officers

The PM should establish a cooperative relationship with the law enforcement agency responsible for traffic crash investigation. The PM should request to be notified of all traffic crashes that occur within the project limits. The PM should also be aware of any agreements with the Department of Public Safety concerning the use of State Troopers on construction projects. When needed, arrangements should be made through the Division/Region Construction Engineer's office for Trooper assistance with traffic handling and speed control through the construction project.

TRAINING

Training on temporary traffic control in work zones appropriate to the job decisions each individual is required to make will be offered periodically. Training may include the need for traffic safety, traffic control planning, quality standards for traffic control devices, and training in application and techniques utilized and prescribed by the MUTCD. Training should also include human factors, proper attire, attitude, and appearance of workers.

PROCESS REVIEW AND EVALUATION

Project Review

Crash Evaluation

The PTCI will report all known work zone crashes to the PM. The PTCI will review the circumstances involved in the crash and, if immediate changes in traffic control are warranted, will recommend those changes to the PM. Subsequently, the PTCI shall complete Form C-25A, Crash Report, and should obtain AUTCRs from the appropriate law enforcement agency. This information, as well as information required of the Contractor by Subarticle 107.14(c) of the Standard Specifications, will be used for Departmental purposes only to evaluate the TCP consistent with the Introduction and Coordination with the Highway Safety Improvement Program sections of this Procedure.

Crash Reporting

The PM will submit the documentation gathered/compiled for each work zone crash, including any additional comments, to the District and Division/Region offices for review as soon as possible following the crash.

Notification of crashes occurring in work zones will be made available to the offices of the State Construction Engineer, State Traffic Operations Engineer, and State Safety Operations Engineer through the CARE reporting system. Hard copies of crash reports will also be made available to these offices upon request by contacting the Safety Program Administrator in the Transportation Planning and Modal Programs Bureau. The State Traffic Operations Engineer may review this information and submit a copy of the report with recommendations or comments to the State Construction Engineer and the State Design Engineer. The State Design Engineer may distribute TCP improvement recommendations to all offices within the Department having responsibility for preparation and/or review of TCPs.

Field Observations

During the daily course of work, all Project personnel will be observant of the work zone for the purpose of identifying work zone impacts and, when possible, taking action toward the alleviation of those impacts. Observations may include occurrences of vehicular congestion, pedestrian impediments, hindrances to emergency vehicles, and crash patterns. Actions to alleviate these impacts may include modification of the traffic control plan in accordance with the Implementation, General section of this Procedure, adjustments to the contractor's operations, or other changes as deemed appropriate.

These observations will be documented in SiteManager on the DWR under the Traffic Control remark type and will include information such as date, time, location of impact, length or duration of impact, TCP phase, and any action taken as a result of the occurrence.

Division/Region Review

The Division/Region Traffic Engineer shall periodically review traffic control devices and traffic operations on Federal aid construction projects. Reviews should be conducted a reasonable time after initial setup and following major phase changes. Any deficiencies shall be reported to the PM. Any report prepared may be submitted to the State Traffic Operations Engineer when deemed appropriate by the Division/Region Engineer.

Statewide Review

Review Team

A Review Team consisting of the State Construction Engineer, State Design Engineer, State Traffic Operations Engineer, Division/Region Engineer, or their designees, shall annually review selected projects throughout the State. The State Construction Engineer shall serve as the chairman of the Review Team. An FHWA representative may accompany the Review Team and provide input. A significant project as defined by 23 CFR 630 Subpart J, will be included when available.

Procedure Review

The Review Team will assess the effectiveness of the Procedure on a state wide basis and recommend revisions to the Procedure when deemed appropriate. All revisions to the Procedure shall be approved by the Transportation Director and the FHWA.

Project Specific Review

The Review Team will make field observations and review available work zone crash data and operational information for the purpose of recommending improvements or modifications to the work zone.

Reporting

The Chairman of the Review Team shall provide a written report to the FHWA, the Design Bureau, the Maintenance Bureau, the Divisions/Regions, and other Departmental offices as appropriate.

Disposition of Records

After the Department accepts a construction project for maintenance, as defined in Item 105.15(c)1. of the Standard Specifications, all records and reports generated and distributed as part of the Department's review and evaluation of traffic crashes shall be forwarded to the Bureau of Transportation Planning and Modal Programs for appropriate processing. Copies of these records and reports will not be filed or maintained in other offices or locations by the Department.

COORDINATION WITH THE HIGHWAY SAFETY IMPROVEMENT PROGRAM

All activities of the Department, its employees, contractors, agents and assigns conducted pursuant to this procedure including, but not limited to, record gathering and retention, inspection, evaluation, review, and reporting, shall be deemed and are a part of the Highway Safety Improvement Program as administered by the Department's Bureau of Transportation Planning and Modal Programs.

ALDOT TRAFFIC CONTROL DEVICE QUALITY GUIDE

Construction Signs **Examples of Acceptable (✓) and Unacceptable (X)**

✓ Good Condition and Visibility

X "1/2" is Wrong Size (Too Small)

X Scratched and Damaged Sheeting

X Old Legend Still Visible

X Damaged Panel

X Cleaning Needed

Construction Signs (continued) **Examples of Acceptable (✓) and Unacceptable (X)**

X Inadequate Space Between Signs

X Excessively High Mounting

✓ Proper Sign Cover

✓ Proper Sign Cover

X Improper Sign Cover

X Improper Sign Cover

Construction Signs (continued) **Examples of Acceptable (✓) and Unacceptable (X)**

X Conflicting Speed Limit Signs

X Missing Sign Cover

X Out of Plumb

X Damaged Posts

Channelizing Drums **Examples of Acceptable (✓) and Unacceptable (X)**

✓ Good Spacing and Alignment

✓ Good Condition and Visibility

X Poor Spacing

X Sheeting in Poor Condition

X Damage to Drum Shape

X Poor Visibility at Night (Drum on Right)

Channelizing Drums (continued)

Examples of Acceptable (✓) and Unacceptable (X)

X Sheeting Too Narrow (6" Minimum Required)

X Covered with Dirt or Asphalt

Type III Barricades

Examples of Acceptable (✓) and Unacceptable (X)

✓ Good Condition

✓ Proper Labeling

X Noticeably Faded Sheeting

X Broken Rail

Type III Barricades (continued) **Examples of Acceptable (✓) and Unacceptable (X)**

X Sheeting Peeling Off Top Rail

X Missing Rail

X Placed at Point of Hazard

Cones **Examples of Acceptable (✓) and Unacceptable (X)**

✓ Good Condition

✓ Good Condition

Cones (continued) **Examples of Acceptable (✓) and Unacceptable (X)**

X Sprayed with Asphalt

X No Sheeting

X Dirty and Poor Sheeting

X Orange Color Required

Portable Concrete Barrier Rail **Examples of Acceptable (✓) and Unacceptable (X)**

✓ Good Condition (Bolt and Loop Type)

✓ Good Condition (J-J Hook Type)

Portable Concrete Barrier Rail (continued)

Examples of Acceptable (✓) and Unacceptable (X)

✓ Info Properly Embossed On Top of Rail

X Bolt Too Small (Minimum Diameter 1 ¼" Required)

X No Nut on Bolt

X Not Bolted at Bottom

X No Reflectors On Top of Rail

X Physical Damage

Striping **Examples of Acceptable (✓) and Unacceptable (X)**

✓ Thorough Removal

✓ Thorough Removal

X Incomplete Removal

X Incomplete Removal

X Incomplete Removal

X Conflicting Stripe

Striping (continued)

Examples of Acceptable (✓) and Unacceptable (X)

X Conflicting Stripe

X Re-Striping Needed

Portable Changeable Message Signs

Examples of Acceptable (✓) and Unacceptable (X)

✓ Good Visibility and Delineation

✓ Good Visibility and Delineation

X Too Low, Not Leveled, Blocking Other Sign

X Not Delineated with Drums

Portable Changeable Message Signs (continued)

Examples of Acceptable (✓) and Unacceptable (X)

X Numerous Pixels Not Working

X Pixel Board Not Working

Vertical Panels

Examples of Acceptable (✓) and Unacceptable (X)

✓ Good Alignment and Condition

✓ Good Alignment and Condition

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APPENDIX

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9.2 Construction Forms

FORM NO.	FORM TITLE (Use Links for Fillable Version)	
C-14	Pile & Driving Equipment Data Form	Metric Version
C-15A	Test Pile Record	Metric Version
C-15A-2	Test Pile Record (continuation)	Metric Version
C-15B	Pile Loading Record – Quick Load Test	Metric Version
C-15B-2	Pile Loading Record – Quick Load Test (continuation)	Metric Version
C-15B-3	Graph for Pile Loading Record (Quick Load Test)	Metric Version
C-15C	Proposed Pile Lengths	
C-16C	Driving Record of Concrete Piling	
C-16S	Driving Record of Steel Piling	
C-17-C	Material Pit Release	
C-19	Time Extension Request for Working Day or Calendar Day Projects	
C-19A	Time Extension Request for Calendar Date Projects	
C-20	Progress Report	
C-21	Partial Payment of Stored Materials	
C-23	Affidavit for Payment of Debts Incurred on Construction Projects	
C-24	Weekly Report of Railway Inspection and/or Flagging	
C-25	Daily Inspection Report of Traffic Control Devices	
C-25A	Crash Report	
C-34	Stormwater Inspection Report and BMP Certification	
C-35	Drilled Shaft Pouring Record	Metric Version
C-35-2	Graph for Drilled Shaft Pouring Record	Metric Version
C-36	Test Drilled Shaft Loading Record	
C-37	Stormwater Noncompliance Notification Report	
C-38	Stormwater Turbidity Sampling Report	
C-40	Material Submittal	
QC/QA-1	Summary of Initial Test Results	
QC/QA-2	Summary of Referee Test Results	
QC/QA-3	Asphalt Pay Factor Adjustment Worksheet	

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FORM C-14 **ALABAMA DEPARTMENT OF TRANSPORTATION**

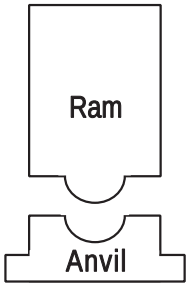
Revised 08-07-95 PILE AND DRIVING EQUIPMENT DATA FORM

Project Number	County	Division

Pile Driving Contractor or Subcontractor	Bridge Identification Number

Details of access method to pile top for dynamic testing are: ☒ Attached ☐ Not Applicable

Hammer Components



Hammer

Manufacturer: _____ Model: _____

Type: _____ Serial No.: _____

Rated Energy: _____ (ft.-lbs.) at _____ (ft.) Length of Stroke

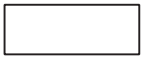
Modifications: _____

_____

_____

_____

_____



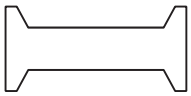
Capblock (Hammer Cushion)

Material: _____

Thickness: _____ (in.) Area: _____ (in.²)

Modulus of Elasticity - E : _____ (P.S.I.)

Coefficient of Restitution - e : _____

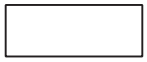


Pile Cap

Helmet ✔
Bonnet
Anvil Block
Drivehead

Weight : _____ (lbs.)

Note: Should include weight of striker plate.



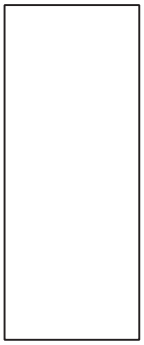
Pile Cushion

Cushion Material: _____

Thickness: _____ (in.) Area: _____ (in.²)

Modulus of Elasticity - E : _____ (P.S.I.)

Coefficient of Restitution - e : _____



Pile

Pile Type: _____

Length (in Leads): _____ (ft.)

Weight / Ft: _____ (lbs./ft.)

Wall Thickness: _____ (in.) Taper: _____

Cross Sectional Area: _____ (in²)

Design Pile Capacity: _____ (Tons)

Description of Splice: _____

_____

Tip Treatment Description: _____

_____

Note: If mandrel is used to drive this pile, attach separate manufacturer's detail sheet(s) including weight and dimensions.

Submitted By:_____ Date:_____

FORM C-14 **ALABAMA DEPARTMENT OF TRANSPORTATION**

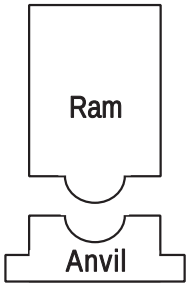
Revised 08-07-95 PILE AND DRIVING EQUIPMENT DATA FORM

Project Number	County	Division

Pile Driving Contractor or Subcontractor	Bridge Identification Number

Details of access method to pile top for dynamic testing are: ☒ Attached ☐ Not Applicable

Hammer Components



Hammer

Manufacturer: _____ Model: _____

Type: _____ Serial No.: _____

Rated Energy: _____ (J) at _____ (m) Length of Stroke

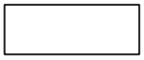
Modifications: _____

_____

_____

_____

_____



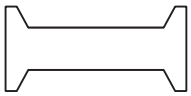
Capblock (Hammer Cushion)

Material: _____

Thickness: _____ (mm) Area: _____ (mm²)

Modulus of Elasticity - E : _____ (MPa)

Coefficient of Restitution - e : _____

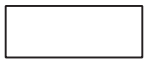


Pile Cap

Helmet ✔
Bonnet
Anvil Block
Drivehead

Mass : _____ (kg)

Note: Should include mass of striker plate.



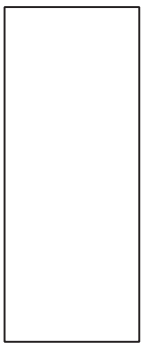
Pile Cushion

Cushion Material: _____

Thickness: _____ (mm) Area: _____ (mm²)

Modulus of Elasticity - E : _____ (MPa)

Coefficient of Restitution - e : _____



Pile

Pile Type: _____

Length (in Leads): _____ (m)

Mass / m: _____ (kg/m)

Wall Thickness: _____ (mm) Taper : _____

Cross Sectional Area: _____ (mm²)

Design Pile Capacity: _____ (kN)

Description of Splice: _____

_____

Tip Treatment Description: _____

_____

Note: If mandrel is used to drive this pile, attach separate manufacturer's detail sheet(s) including mass and dimensions.

Submitted By:_____ Date:_____

FORM C-15A

Revised 08-07-95

ALABAMA DEPARTMENT OF TRANSPORTATION

TEST PILE RECORD

Project Number	County	Division
Bridge Station / To Station	Bridge Identification Number	
Road Between	and	
Contractor	Inspector	
Date / Bent No. & Lane	Pile No.	Kind of Soil
Kind of Pile	Size of Pile	Total Length (ft.)
Elev. Ground Line at Pile	Final Elev. at Top of Pile	Tip Elevation
Hammer Make	Hammer Model	Hammer Kind
Hammer Type	Hammer Action	Rated Energy (ft.-lbs.)
Weight of Hammer (lbs.)	Design Load (from plans) (tons)	
Hammer Cushion: Material	Thickness (in.)	Area (sq. in.)
Pile Cushion (Before Driving): Material	Thickness (in.)	Area (sq. in.)
Pile Cushion (After Driving): Material	Thickness (in.)	Area (sq. in.)
Pile Cap Weight (lbs.)		

Height Of Fall (feet)	Energy Delivered To Pile (E) (ft.-lbs.)	Blows Per Foot Of Penetration (N)	Total Penetration (feet)	Bearing (Ru) (tons)

REMARKS

1. When using open type and gravity hammers, record weight of hammer and height of fall of hammer. Show rated energy when using closed type hammers.
2. Energy delivered to pile should be maintained practically constant once record keeping has begun unless specified otherwise by the Engineer.
3. Pile cushion is only required with concrete piling.
4. Pile cushion thickness after driving must be at least one-half the original thickness.
5. The bearing should be determined from the graph of Blows/Foot versus Bearing which is provided from the Wave Equation Analysis or Dynamic Formula of the driving system. If a graph is not provided, refer to Item 505.03(b)2. of the specifications to estimate the bearing capacity using the Dynamic Formula.
6. Driving should be continuous. Note any interruptions exceeding one hour.
7. Draw sketch on back of this sheet showing location of test pile.
8. For continuation of test pile record, use Form C-15A-2.
9. Test pile (check one): Static Load Tested _X_ Dynamic Load Tested ____ (if static load tested, load test report shall be attached to this report).

Correct_____ **Approved**_____

Project Engineer **Division Engineer**

Sheet No. 1 of ___

FORM C-15A-2 **ALABAMA DEPARTMENT OF TRANSPORTATION**

Revised 08-07-95 CONTINUATION OF TEST PILE RECORD

Project Number	County	Division

Bridge Station	To Station	Bridge Identification Number

Date	Bent No. & Lane	Pile No.	Kind of Soil

Height Of Fall (feet)	Energy Delivered To Pile (E) (ft.-lbs.)	Blows Per Foot Of Penetration (N)	Total Penetration (feet)	Bearing (Ru) (tons)

Sheet No. ___ of ___

FORM C-15A **ALABAMA DEPARTMENT OF TRANSPORTATION**

Revised 08-07-95

TEST PILE RECORD

Project Number	County	Division
Bridge Station / To Station	Bridge Identification Number	
Road Between	and	
Contractor	Inspector	
Date / Bent No. & Lane	Pile No.	Kind of Soil
Kind of Pile	Size of Pile	Total Length (m)
Elev. Ground Line at Pile	Final Elev. at Top of Pile	Tip Elevation
Hammer Make	Hammer Model	Hammer Kind
Hammer Type	Hammer Action	Rated Energy (J)
Mass of Hammer (kg)	Design Load (from plans) (kN)	
Hammer Cushion: Material	Thickness (mm)	Area (mm²)
Pile Cushion (Before Driving): Material	Thickness (mm)	Area (mm²)
Pile Cushion (After Driving): Material	Thickness (mm)	Area (mm²)
Pile Cap Mass (kg)		

Height Of Fall (m)	Energy Delivered To Pile (E) (J)	Blows Per 0.3 m Of Penetration (N)	Total Penetration (m)	Bearing (Ru) (kN)

REMARKS

1. When using open type and gravity hammers, record mass of hammer and height of fall of hammer. Show rated energy when using closed type hammers.
2. Energy delivered to pile should be maintained practically constant once record keeping has begun unless specified otherwise by the Engineer.
3. Pile cushion is only required with concrete piling.
4. Pile cushion thickness after driving must be at least one-half the original thickness.
5. The bearing should be determined from the graph of Blows/0.3 m versus Bearing which is provided from the Wave Equation Analysis or Dynamic Formula of the driving system. If a graph is not provided, refer to Item 505.03(b)2. of the specifications to estimate the bearing capacity using the Dynamic Formula.
6. Driving should be continuous. Note any interruptions exceeding one hour.
7. Draw sketch on back of this sheet showing location of test pile.
8. For continuation of test pile record, use Form C-15A-2.
9. Test pile (check one): Static Load Tested _X_ Dynamic Load Tested ____ (if static load tested, load test report shall be attached to this report).

Correct_____ **Approved**_____

Project Engineer **Division Engineer**

Sheet No. 1 of ___

FORM C-15A-2 **ALABAMA DEPARTMENT OF TRANSPORTATION**

Revised 08-07-95 CONTINUATION OF TEST PILE RECORD

Project Number	County	Division

Bridge Station	To Station	Bridge Identification Number

Date	Bent No. & Lane	Pile No.	Kind of Soil

Height Of Fall (m)	Energy Delivered To Pile (E) (J)	Blows Per 0.3 m Of Penetration (N)	Total Penetration (m)	Bearing (Ru) (kN)

Sheet No. ___ of ___

FORM C-15B **ALABAMA DEPARTMENT OF TRANSPORTATION**

Revised 07-15-94 PILE LOADING RECORD - QUICK LOAD TEST

Project Number	County	Division

Station, Bent No. & Lane	Bridge Identification Number

Contractor	Inspector

Date	Pile Number	Length of Pile (Feet)
Size and Type of Pile	Calculated Elastic Modulus of Pile (E) (ksi)	Measured Elastic Modulus of Pile (E) (ksi)
Dist. From Settlement Gage To Pile Tip(Feet)	Elevation of Ground Line at Pile	Pile Tip Elevation
Design Load (Tons)	Maximum Applied Load (Tons)	Ultimate Capacity (Q_f) (Tons)

Elapsed Time (Minutes : Seconds)	Increment Of Load (Tons)	Total Accumulated Load (Tons)	Settlement Before Loading Increment (Inches)	Settlement After Loading Increment (Inches)
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Pile Loading Record Continued On Sheet No. 2 of 2

FORM C-15B-2 **ALABAMA DEPARTMENT OF TRANSPORTATION**

Revised 07-15-94 PILE LOADING RECORD - QUICK LOAD TEST (CONT.)

Project Number	County	Division

Station, Bent No. & Lane	Bridge Identification Number

Date	Pile Number	Length of Pile (Feet)

Elapsed Time (Minutes : Seconds)	Increment Of Load (Tons)	Total Accumulated Load (Tons)	Settlement Before Loading Increment (Inches)	Settlement After Loading Increment (Inches)
Pile Loading Record Continued From Sheet No. 1 of 2				
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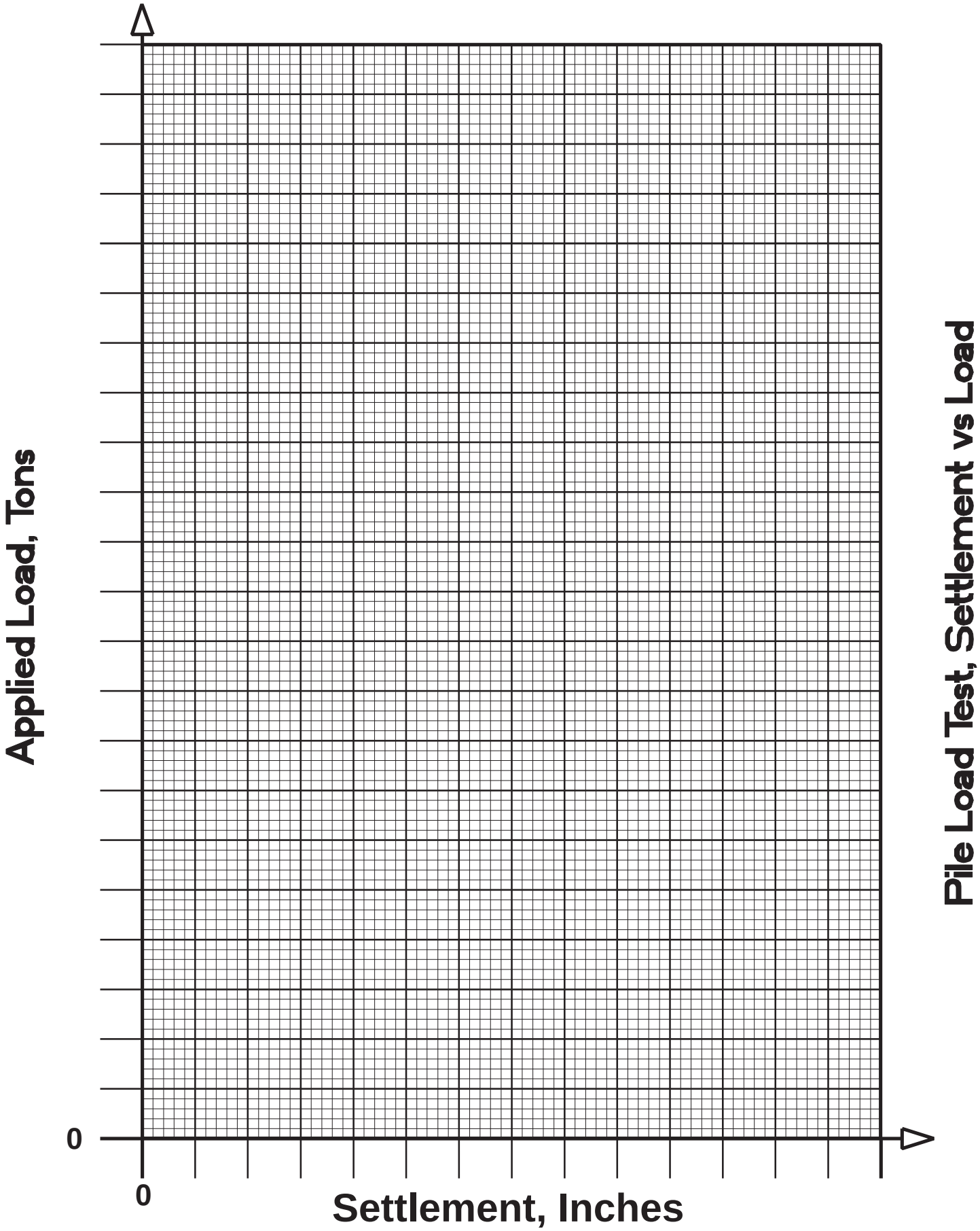
☑ Check Here For A Passing Load Test ☐ Check Here For A Failing Load Test

Submitted By: (Project Engineer)

Submitted By: (Division Engineer)


Pile Load Test, Settlement vs Load
Applied Load, Tons
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0
Settlement, Inches

FORM C-15B **ALABAMA DEPARTMENT OF TRANSPORTATION**

Revised 07-15-94 PILE LOADING RECORD - QUICK LOAD TEST

Project Number	County	Division

Station, Bent No. & Lane	Bridge Identification Number

Contractor	Inspector

Date	Pile Number	Length of Pile (m)
Size and Type of Pile	Calculated Elastic Modulus of Pile (E) (MPa)	Measured Elastic Modulus of Pile (E) (MPa)
Dist. From Settlement Gage To Pile Tip (m)	Elevation of Ground Line at Pile	Pile Tip Elevation
Design Load (kN)	Maximum Applied Load (kN)	Ultimate Capacity (Q_f) (kN)

Elapsed Time (Minutes : Seconds)	Increment Of Load (kN)	Total Accumulated Load (kN)	Settlement Before Loading Increment (mm)	Settlement After Loading Increment (mm)
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Pile Loading Record Continued On Sheet No. 2 of 2

FORM C-15B-2 **ALABAMA DEPARTMENT OF TRANSPORTATION**

Revised 07-15-94 PILE LOADING RECORD - QUICK LOAD TEST (CONT.)

Project Number	County	Division

Station, Bent No. & Lane	Bridge Identification Number

Date	Pile Number	Length of Pile (m)

Elapsed Time (Minutes : Seconds)	Increment Of Load (kN)	Total Accumulated Load (kN)	Settlement Before Loading Increment (mm)	Settlement After Loading Increment (mm)
Pile Loading Record Continued From Sheet No. 1 of 2				
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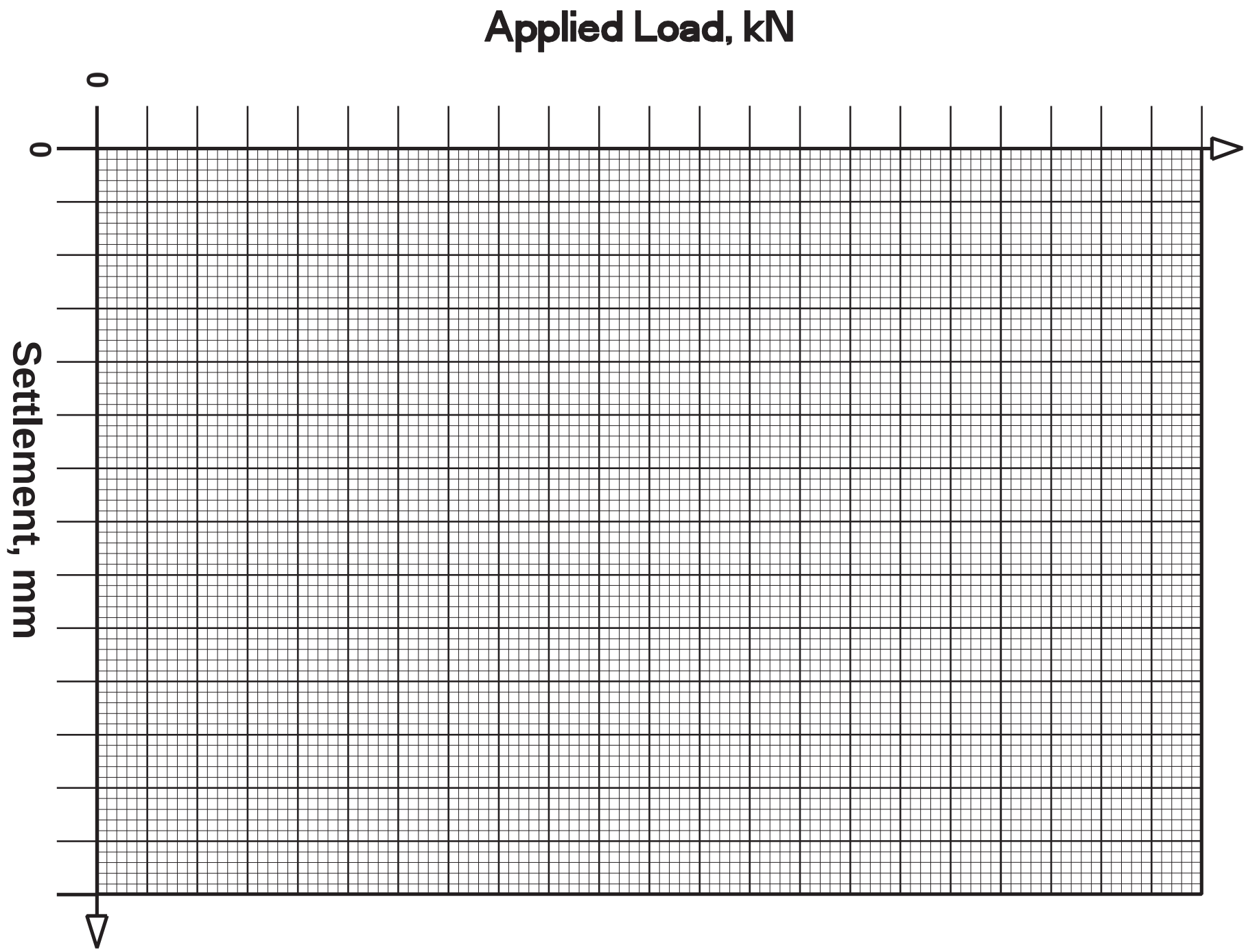
☑ Check Here For A Passing Load Test ☐ Check Here For A Failing Load Test

Submitted By: (Project Engineer)

Submitted By: (Division Engineer)



Pile Load Test, Settlement vs Load

FORM C-15C **ALABAMA DEPARTMENT OF TRANSPORTATION**

Revised 07-15-94

PROPOSED PILE LENGTHS

TEST PILE DATA

TO BE COMPLETED BY PROJECT ENGINEER

Project Number	County	Division
Bridge Station / To Station	Bridge Identification Number	
Road Between	and	
Contractor	Inspector	
Date / Bent No. & Lane	Pile No.	Kind of Soil
Kind of Pile / Size of Pile	Length in Structure	
Cut Off Elevation at Top of Pile	Tip Elevation	

FURNISHED PILE LENGTHS

TO BE COMPLETED BY CONTRACTOR'S REPRESENTATIVE

Based on data of the test pile driven in above bent, it is proposed to furnish pile lengths for bents as listed below:

BENT NUMBER	FOOTING	PILE NUMBER	PROPOSED LENGTHS

Date: _____ **Signed:** _____

Contractor's Representative

The above proposed pile lengths have been reviewed by me and in my opinion are sufficient for proposed lengths based on the test pile driven at the above location. Actual lengths of individual piles will be determined by the Engineer or Inspector during driving operations.

Date: _____ **Signed:** _____

Project Engineer

Signed: _____

Division Construction Engineer

cc: **Contractor**
Division Office
District Office
Project Office

FORM C-16C

Created 05-21-01

ALABAMA DEPARTMENT OF TRANSPORTATION

DRIVING RECORD OF CONCRETE PILING

Project Number	County	Division
Bridge: Station to Station	Bridge Identification Number	
Road Between and	Lane (if applicable)	
Contractor	Sub-Contractor	Inspector
Size of Piling		

Hammer Make	Hammer Model	Hammer Kind	Average Finished Groundline Elevation of Structure
Hammer Type	Hammer Action	Design Load (from plans)	

Date	Bent No.	Pile No.	Furn. Length (feet) {m}	Cut-Off Payment (feet) {m}	Splice Payment (feet) {m}	Actual Length of Build-Up (feet) {m}	Actual Length of Cut-Off (feet) {m}	Actual Driven Length (feet) {m}	Height of Fall (feet) {m}	Energy Delivered (ft.-lbs.) {J}	Blows per foot {0.3 m} of Penet.	Tip Elev.	Bearing (tons) {kN}
SUBTOTALS:													
TOTAL:													

REMARKS

1. Bents numbered as per plans. In general, piles numbered from left to right.
2. Draw sketches on back showing numbering sequence of piles in abutments, trestle bents, and bent footings. Also show any changes in plans on back.
3. If a pile is cut-off, add 6 feet {2 m} in "Cut-Off Payment" column. If a pile receives a non-driven build-up, add 30 feet {10 m} in the "Splice Payment" column.
4. Combine the totals for the columns "Furnished Length", "Cut-Off Payment", "Splice Payment and "Actual Length of Build-Up" for the payment amount of Concrete Piling Furnished.

Correct_____ **Approved**_____

Project Engineer **Division Engineer**

FORM C-16S

Created 05-21-01

ALABAMA DEPARTMENT OF TRANSPORTATION

DRIVING RECORD OF STEEL PILING

Project Number	County	Division

Bridge: Station to Station	Bridge Identification Number

Road Between and	Lane (if applicable)

Contractor	Sub-Contractor	Inspector

Size of Piling

Hammer Make	Hammer Model	Hammer Kind	Average Finished Groundline Elevation of Structure
Hammer Type (Open or Closed)	Hammer Action	Design Load (from plans)	

Date	Bent No.	Pile No.	Proposed Length (feet) {m}	Furn. Length (feet) {m}	Added Pile (feet) {m}	Pile Heat No.	Actual Length Cutoff (feet) {m}	Actual Length in Str. (feet) {m}	Total Splices	Height of Fall (feet) {m}	Energy Delivered (ft.-lbs.) {J}	Blows per foot {0.3 m} of Penet.	Tip Elev.	Bearing (tons) {kN}
TOTALS:														

REMARKS

1. Bents numbered as per plans. In general, piles numbered from left to right.
2. Draw sketches on back showing numbering sequence of piles in abutments, trestle bents, and bent footings. Also show any changes in plans on back.

Correct_____ **Approved**_____

Project Engineer **Division Engineer**

Form C-17-C
Rev 03/14

ALABAMA DEPARTMENT OF TRANSPORTATION
MATERIAL PIT RELEASE

STATE OF ALABAMA
COUNTY OF _____

Project No.:_____
County: _____

I, (We) _____ hereby certify to the following in connection with the removal of _____ from material pit(s) located on my (our) land in _____County, Alabama, and used on the above numbered project.

1. That I (we) have received payment in full from _____, Contractor on the project, for _____ cubic yards of _____ @ $ _____ per cubic yard.
2. That the material pit(s) has (have) been satisfactorily cleared of all debris, properly drained and surplus material leveled.
3. That I (we) hereby release _____, (Contractor) the Alabama Department of Transportation, and _____County from all liability of any nature, either present or consequential in connection with the removal of _____ from my (our) property.

IN WITNESS whereof I (we) have hereunto set my (our) hand and seal this the _____ day of _____, 20____.

WITNESSES:	OWNER(S):
_____	_____
_____	_____

Form C-19
Rev 04/13

ALABAMA DEPARTMENT OF TRANSPORTATION
TIME EXTENSION REQUEST
⦿ Working Day or ○ Calendar Day Projects

Project No.: _____ County: _____

Contractor: _____

Contract status shown below is from time statement for period ending: _____

CURRENT STATUS			REMARKS
Original Contract	Working/Calendar Days in Contract:		
	Original Estimated Completion Date:		
Previously Approved Extensions	Additional Working/Calendar Days:		
	Estimated Completion Date:		
	Number Working/Calendar Days Used:		
	% Working/Calendar Days Used:		
	% Project Complete:		

Reason Number	Reason for Requested Extension	Extension Requested by Contractor (Days)	Extension Approved by Division (Days)
	Total:		

STATUS WITH APPROVAL OF RECOMMENDED TIME EXTENSION			REMARKS
	Revised Estimated Completion Date:		
	Total Working/Calendar Days Allowed:		
	Revised % Working/Calendar Days Used:		

Division Engineer, ALDOT
Approved

Date

Division Administrator, FHWA
Approved for Federal Participation

Date

Form C-19A
Rev 03/12

ALABAMA DEPARTMENT OF TRANSPORTATION
TIME EXTENSION REQUEST
For Calendar Date Projects

Project No.: _____ County: _____

Contractor: _____

Contract status shown below is from time statement for period ending: _____

CURRENT STATUS			REMARKS
Original Contract	Calendar Start Date:		
	Calendar Completion Date:		
	Calendar Days Allowed:		
Previously Approved Extensions	Additional Calendar Days:		
	Revised Calendar Completion Date:		
	Number Calendar Days Used:		
	% Calendar Days Used:		
	% Project Complete:		

Reason Number	Reason for Requested Extension	Extension Requested by Contractor (Days/Date)	Extension Recommended by Division (Days/Date)	Extension Approved by Const Bureau (Days/Date)
	Total:			

STATUS WITH APPROVAL OF RECOMMENDED TIME EXTENSION		REMARKS
New Calendar Completion Date:		
Total Equivalent Calendar Days Allowed:		
Revised % Calendar Days Used:		

_____ _____
Division Engineer, ALDOT
Recommended for Approval
Date

_____ _____
Construction Engineer, ALDOT
Approved
Date

_____ _____
Division Administrator, FHWA
Approved for Federal Participation
Date

Form C-20
Rev 10-10

ALABAMA DEPARTMENT OF TRANSPORTATION
PROGRESS REPORT

Contract Id: _____
Project: _____
County: _____
Div: _____ Dist : _____
Date: _____

Contractor: _____
_____
_____

The time charged on the above referenced project from through is day(s).

Day Date	Time Charged	Remarks	Day Date	Time Charged	Remarks

To Date as of

Days in Contract:	Days Charged:
Extensions Approved:	Days Remaining:
Days Allowed:	% Time Elapsed:
Est. Date of Completion:	% Project Complete:

Notes:
1. The original copy of this report shall be mailed to the Contractor's home office and a copy shall be given to the Contractor's project superintendent.
2. Any objections to the above charges should be filed as outlined in Subarticle 108.08(d).

cc: Division Office (3)
District Office (1)
Project Office (1)

Project Manager: _____
Print Name:

Form C-21
Rev 03/14

ALABAMA DEPARTMENT OF TRANSPORTATION
PARTIAL PAYMENT OF STORED MATERIALS

Project No.: _____ Division/Region: _____ County: _____

Contractor: _____

INSPECTION OF STORAGE AREA AND STORED MATERIALS			
Location of Storage Area			
Description of Stored Materials			
Is Storage Area proper for the type of materials being stored? Remarks:			Yes No
Are materials properly stored and separated for this project? Remarks:			Yes No
List Invoice or Order Numbers covering these materials.			
List any materials shown on invoice or order numbers but not on hand.			
List any data which you might have, to document that these materials conform to requirements of the plans and specifications (Primarily applies to materials inspected by State Inspector during fabrication).			
Inspected By: _____ Printed _____ Signed _____ Date			

DOCUMENTATION (TO BE COMPLETED BY PROJECT PERSONNEL)			
Date of Contractor's Written Request		75% of Contract Item Total Bid Price	1. $
Contract Item of Stored Materials		Stored Material Invoiced Amount	2. $
Test reports on-hand to cover all materials?			Yes No
If NO, list other documentation:			
Do the materials conform to the requirements of the plans and specifications?			Yes No
Payment Amount (to be lesser of 1 or 2 and must total $2,500 or more)			$

PAYMENT APPROVAL

I do not approve partial payment for the stored materials covered by this document after reviewing the above information.
I approve partial payment for the stored materials covered by this document after reviewing the above information.

Payment to be included on Estimate No: _____

_____ Project Manager _____ Date

CERTIFICATION (TO BE COMPLETED BY PROJECT PERSONNEL)

An invoice was received on _____ with the proper certification statement as per Article 109.07.
CONTINUATION of partial payment approval is supported.

An invoice was not received OR did not have the proper certification statement as per Article 109.07.
WITHDRAWAL of partial payment is to be on Estimate No: _____.

NOTES

(1) Each time invoices are submitted, a separate Form C-21 must be completed for each eligible pay item or pay item group (first four characters must match). Example: 641A512, 641A514, 641A518.
(2) Written Request by the Contractor for partial payment is required for each eligible pay item of which the materials are a part.
(3) As per Article 109.07, an invoice or an accumulation of invoices for each eligible pay item must total $2,500 or more (Less any Discounts to Contractor) before consideration will be given for making partial payment.
(4) As per Article 109.07, the certification must read, "I do hereby certify that this is a true and correct invoice," and be followed by the signature of an authorized representative of the supplier.

Form C-23

Alabama Department of Transportation

Affidavit for Payment of Debts Incurred on Construction Projects

Project No. _____

County _____

Contractor _____

Description and Location of Project _____

_____

This is to certify that all known debts for labor and materials used on the project and all approved sub-contractual obligations associated with the construction of Project _____ **,** _____ **County, have been paid or will be paid within 5 days after final payment.**

Sworn to me this the _____ **day of** _____ **,** _____ **.**
(month) (year)

_____
(Name)

_____
(Title)

_____
(Contractor)

Sworn to and subscribed before me the _____ **day of** _____ **,** _____ **.**
(month) (year)

_____
(Notary Public)

For _____ **County** _____ **State**

My commission expires _____
(date)

Form C-24
Rev 03/14

ALABAMA DEPARTMENT OF TRANSPORTATION
WEEKLY REPORT OF RAILWAY INSPECTION AND/OR FLAGGING

Project No.: _____ Date: _____

Division/Region: _____ County: _____

INSPECTION BY RAILWAY			
Name of Inspector		Date(s) of Inspection	
Residence		Base Location	
Explain Need For Railway Inspector			
Time of Inspection	Begin	End	Total Hours

FLAGGING BY RAILWAY			
Name of Flagman		Date(s) of Flagging	
Residence		Base Location	
Time of Inspection	Begin	End	Total Hours

FLAGGING BY RAILWAY			
Name of Flagman		Date(s) of Flagging	
Residence		Base Location	
Time of Inspection	Begin	End	Total Hours

REASON FOR NEED OF FLAGGING SERVICE (D.O.T. REIMBURSEMENT)
Working Within Specified Track Clearance Working Over Tracks Work Likely to Disturb Surface and Alignment of Tracks Other Work Within Railway R.O.W. Other:

REASON FOR NEED OF FLAGGING SERVICE (CONTRACTOR REIMBURSEMENT)*
Transporting Materials and/or Equipment Across Temporary Grade Crossing Other:

DESCRIPTION OF CONTRACTOR'S OPERATIONS WITHIN VICINITY OF RAILWAY

SIGNATURES:

_____
Dept. of Transportation Representative

_____
Railway Inspector

_____
Railway Flagger

_____
Railway Flagger

_____
Contractor's Representative

* (Required only if reimbursement must be made by the contractor to the railway company.)

Form C-25 *Revised 1/2012*

ALABAMA DEPARTMENT OF TRANSPORTATION
DAILY INSPECTION OF TRAFFIC CONTROL DEVICES

Sheet ___ of ___

Project Number:	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Day	Week Ending (Sat):
								Date	
County:								Time	Contractor:
								✓ if Night Insp	

TRAFFIC CONTROL DEVICE(S) and **LOCATION**	**TCD CONDITION** "✓" denotes device properly maintained. "X" denotes devices *NOT* properly maintained.							**REMARKS** Must be completed for "X" condition to describe type of deficiency (sheeting damaged, light not working, etc.).	**DATE CORRECTED**

_____ Project Traffic Control Inspector

Reviewed by: _____ Project Manager

Form C-25 *Revised 1/2012*

ALABAMA DEPARTMENT OF TRANSPORTATION
DAILY INSPECTION OF TRAFFIC CONTROL DEVICES (Continuation)

Sheet ___ of ___

Project Number:	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Day	Week Ending (Sat):
								Date	
County:								Time	Contractor:
								✓ if Night Insp	

TRAFFIC CONTROL DEVICE(S) and **LOCATION**	**TCD CONDITION** "✓" denotes device properly maintained. "X" denotes devices *NOT* properly maintained.							**REMARKS** Must be completed for "X" condition to describe type of deficiency (sheeting damaged, light not working, etc.).	**DATE CORRECTED**

Form C-25-A
Rev. 3/2008

Alabama Department of Transportation

CRASH REPORT

Project Information			
Date		**Project /Contract ID**	
Division		**Contractor**	
District		**Project Description**	
County		**Location**	

Crash Information			
Date of Crash		**Time of Crash**	
Weather Condition		**Road Condition**	

Location of Crash (Use Mile Post Reference if Possible)

Description of Traffic Control in place (lane closures, haul road crossing, etc.) List Typical Application (TA #) from MUTCD, Part 6 if applicable.

Phase of Sequence of Construction in Use at Time of Crash, if Applicable

Type of Work Being Performed in Crash Area, if Applicable

Injuries or Fatalities

Vehicles (Type), Equipment, etc. Involved

Description of Crash (List names of witnesses, investigating officer, and other pertinent data)

_____
Signature of Project Traffic Control Inspector

pc: District
Division
File

Attachments: Alabama Uniform Traffic Crash Report (AUTCR)
Contractor's Written Report

Form C-34 (Field Worksheet)
Revised 03/13

Alabama Department of Transportation
Stormwater Inspection Report and BMP Certification

Permit Number:		Inspection Number:	
ALR Number:		Inspection Date:	
Division:		Inspection Type:	
Project:		Weather:	
County:		Last Rainfall Date:	
Beg Project Latitude:		ALDOT QCI:	
Beg Project Longitude:		Contractor QCI:	
End Project Latitude:		Contractor QCI Present:	
End Project Longitude:		Project Manager:	
Priority Const. Site:		Site Discharging:	
Disturb ≥ 10 Acres:		Stormwater Sampled:	
Location Description:			

Comments: Rainfall Accumulation (in) = Rainfall Duration (hrs) = Event Frequency:

Did discharges of sediment or other pollutants occur from the site? _____

Were BMPs properly implemented and maintained at the time of inspection? _____

Are BMPs needed in addition to those already present onsite at the time of inspection? _____

Have any BMPs failed to operate as designed? _____

Were there BMPs required by the CBMPP that were not installed or installed in a manner not consistent with the CBMPP? _____

1. The Condition shall be noted as Satisfactory (S), Needs Improvement (NI), Turbid Discharge (TD), or Sediment Loss (SL). See guidelines and definitions in the Construction Manual. Form C-37 shall be completed for all sites in a Turbid Discharge or Sediment Loss condition. All Needs Improvement and Sediment Loss citations must be addressed on following inspections.

Site Number	Condition[1] (S, NI, TD, or SL)	Remarks

Sheet ___ of ___

Form C-34 (Field Worksheet)
Revised 03/13

Permit Number: ______________________ Inspection Number: ______________________

ALR Number: ______________________ Project: ______________________

1. The Condition shall be noted as Satisfactory (S), Needs Improvement (NI), Turbid Discharge (TD), or Sediment Loss (SL). See guidelines and definitions in the Construction Manual. Form C-37 shall be completed for all sites in a Turbid Discharge or Sediment Loss condition. All Needs Improvement and Sediment Loss citations must be addressed on following inspections.

Site Number	Condition[1] (S, NI, TD, or SL)	Remarks

Sheet ___ of ___

FORM C-35 **ALABAMA DEPARTMENT OF TRANSPORTATION**

Revised 07-15-94 DRILLED SHAFT POURING RECORD

Project Number	County	Division
Bridge Station / To Station	Bridge Identification Number	
Road Between	and	
Contractor	Inspector	
Date / Bent No. & Lane	Shaft No.	Kind of Soil
Diameter of Shaft	Shaft Volume per Linear Foot (V_{LF})	Shaft Tip Elevation

Load Number	Quantity (Cu. Yds.)	Slump (In.)	Pouring Time		Concrete Elevation	Tremie Tip Elevation	Cylinder Number
			Start	Finish			

V_Q = _____

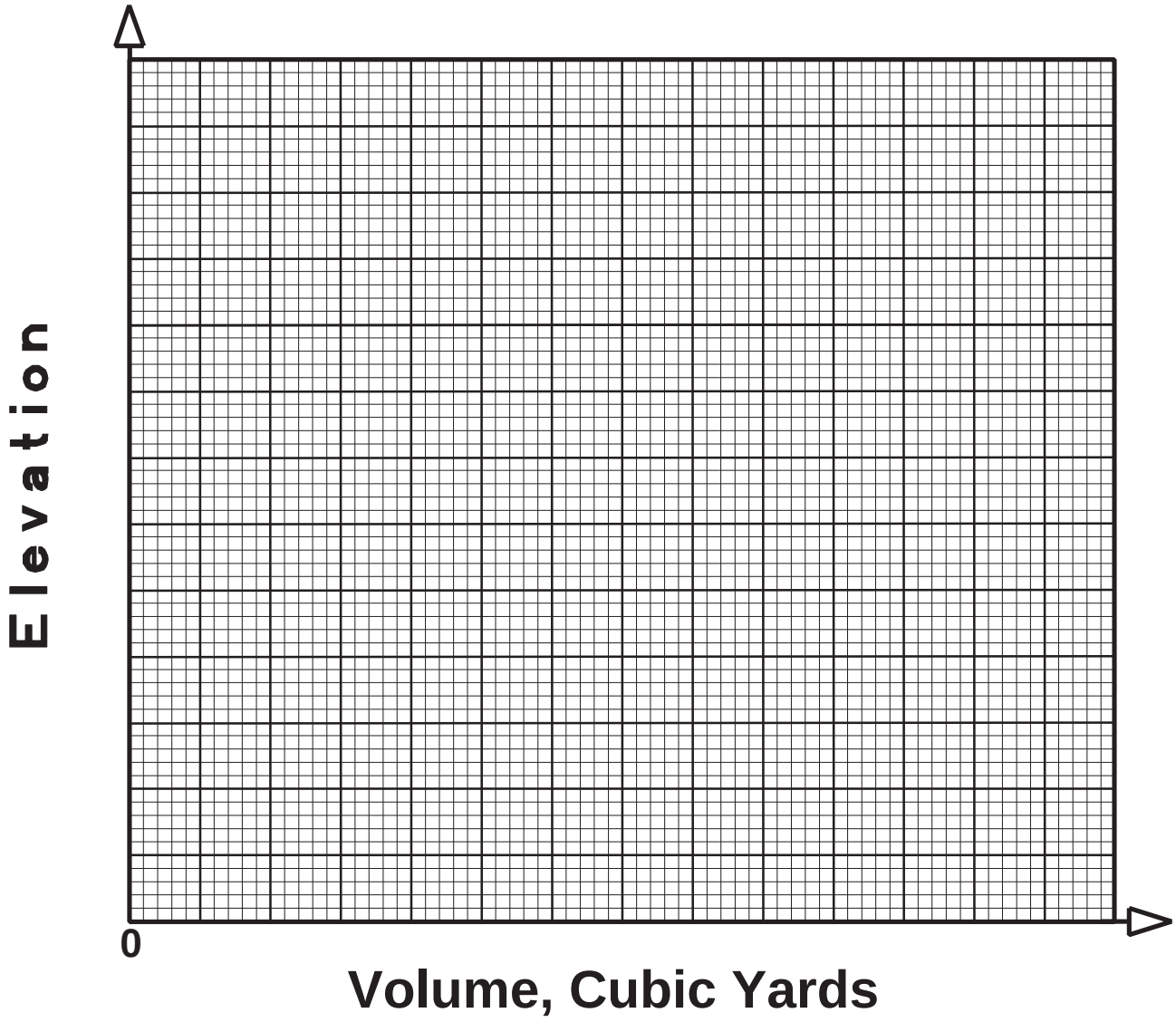
1. Top of concrete elevation at completion of pour prior to trimming any excess : _____
2. Shaft length before trimming : **L** = _____ Ft.
3. Corresponding theoretical volume : $V_T = V_{LF} \times L$ = _____ Cu. Yds.
4. Volume of excess in last truck : V_E = _____ Cu. Yds.
5. Volume of overflow (if any) : V_O = _____ Cu. Yds.
6. Actual shaft volume before trimming : $V_A = V_Q - V_E - V_O$ = _____ Cu. Yds.
7. Overpour : $\frac{V_A - V_T}{V_T} \times 100$ = _____ %

REMARKS

1. Record any problems with the operation of the mixing plant, supply irregularities (concrete delays), or possible setbacks (loss of priming in the tremie, movement of reinforcing steel, difficulties with extraction of temporary casing, caving of shaft wall, etc.) on the back of this sheet in the space provided for observations.
2. A theoretical volume versus elevation line should be plotted on the graph on the back of this sheet prior to concrete placement.
3. The actual concrete placement curve should be plotted during construction of the shaft. An elevation check should be taken as each truck pours out and the data recorded above and plotted on graph.
4. Any large variations of the actual concrete placement curve from the theoretical placement line should be investigated.
5. Draw sketch on back of this sheet showing location of shaft.

Correct_____ **Approved**_____

Project Engineer **Division Engineer**



OBSERVATIONS:

_____

_____

_____

_____

_____

_____

_____

LOCATION OF SHAFT:

FORM C-35 **ALABAMA DEPARTMENT OF TRANSPORTATION**

Revised 07-15-94 DRILLED SHAFT POURING RECORD

Project Number	County	Division
Bridge Station / To Station	Bridge Identification Number	
Road Between	and	
Contractor	Inspector	
Date / Bent No. & Lane	Shaft No.	Kind of Soil
Diameter of Shaft (m)	Shaft Volume per meter of length (Vm)	Shaft Tip Elevation

Load Number	Quantity (m^3)	Slump (mm)	Pouring Time Start	Pouring Time Finish	Concrete Elevation	Tremie Tip Elevation	Cylinder Number

V_Q = _____

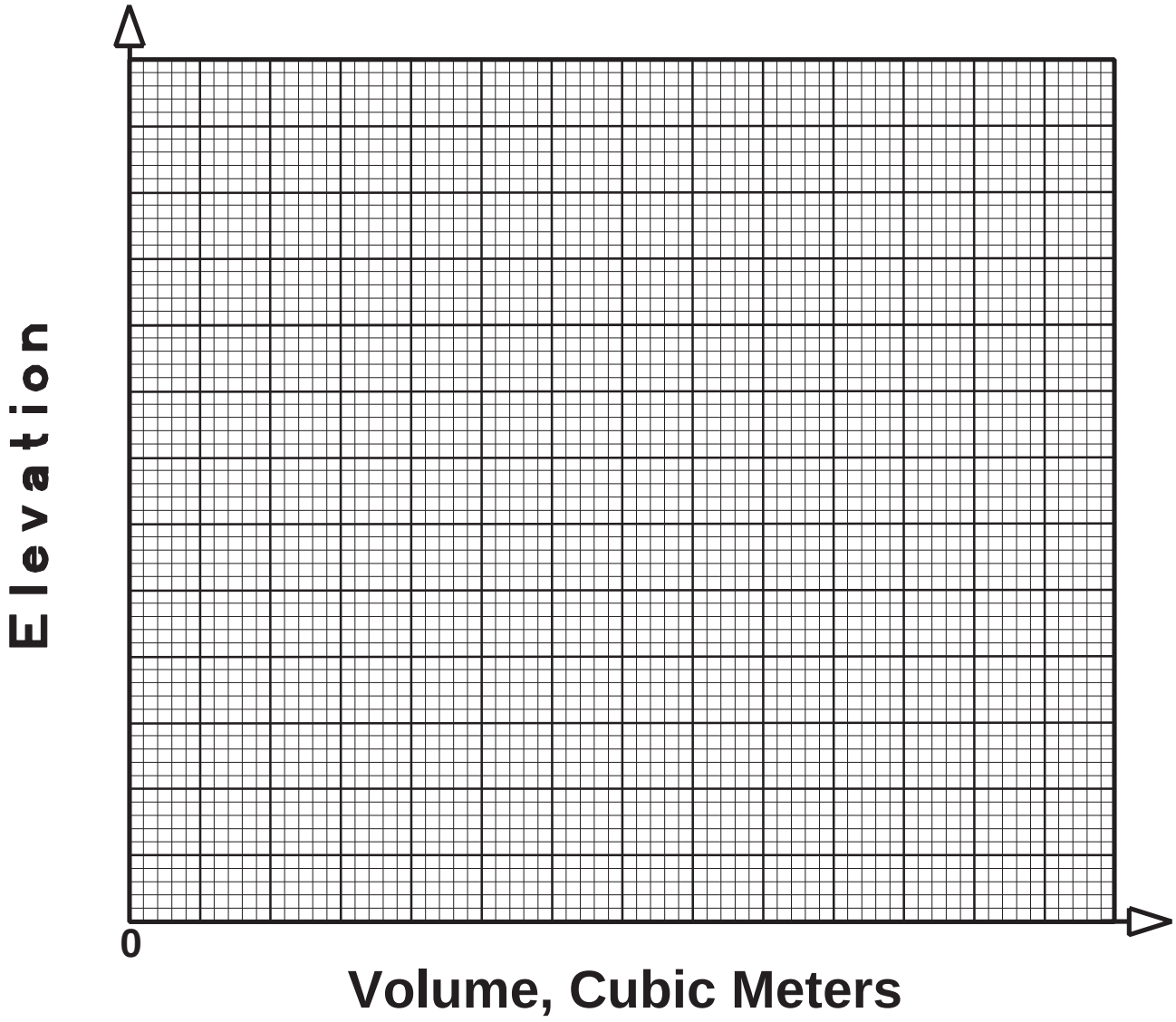
1. Top of concrete elevation at completion of pour prior to trimming any excess : _____
2. Shaft length before trimming : **L** = _____ m
3. Corresponding theoretical volume : $V_T = V_m \times L$ = _____ m^3
4. Volume of excess in last truck : V_E = _____ m^3
5. Volume of overflow (if any) : V_O = _____ m^3
6. Actual shaft volume before trimming : $V_A = V_Q - V_E - V_O$ = _____ m^3
7. Overpour : $\frac{V_A - V_T}{V_T} \times 100$ = _____ %

REMARKS

1. Record any problems with the operation of the mixing plant, supply irregularities (concrete delays), or possible setbacks (loss of priming in the tremie, movement of reinforcing steel, difficulties with extraction of temporary casing, caving of shaft wall, etc.) on the back of this sheet in the space provided for observations.
2. A theoretical volume versus elevation line should be plotted on the graph on the back of this sheet prior to concrete placement.
3. The actual concrete placement curve should be plotted during construction of the shaft. An elevation check should be taken as each truck pours out and the data recorded above and plotted on graph.
4. Any large variations of the actual concrete placement curve from the theoretical placement line should be investigated.
5. Draw sketch on back of this sheet showing location of shaft.

Correct_____ **Approved**_____

Project Engineer **Division Engineer**



OBSERVATIONS:

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LOCATION OF SHAFT:

FORM C-36

Revised

ALABAMA DEPARTMENT OF TRANSPORTATION

TEST DRILLED SHAFT LOADING RECORD

Project number:	County:	Division:

Location of shaft: Station:	Bridge Identification Number:
Contractor:	Inspector:

Date:	Diameter of shaft (Inches):	Bottom of shaft elevation:	Top of shaft elevation:
Design load (Tons):	Test load (400% of design load) (tons):	Ground line elevation:	Length of shaft (feet):

Elapsed time (Min : Sec)	Increment of load (Tons)	Total accumulated load (Tons)	Settlement at telltale Gage #1 (Inches)	Settlement at telltale Gage #2 (Inches)	Settlement at telltale Gage #3 (Inches)	Settlement at telltale Gage #4 (Inches)	Settlement at top of shaft Gage #5 (Inches)	Settlement at top of shaft Gage #6 (Inches)	Movement between test plate & top of shaft; Gage #7 (Inches)	Settlement from reference scale (Inches)
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Form C-37 (Field Worksheet)
Revised 03/13

Alabama Department of Transportation
Stormwater Noncompliance Notification Report

Permit Number:		Inspection Number:	
ALR Number:		Inspection Date:	
Division:		Inspection Type:	
Project:		Weather:	
County:		Last Rainfall Date:	
Beg Project Latitude:		ALDOT QCI:	
Beg Project Longitude:		Contractor QCI:	
End Project Latitude:		Contractor QCI Present:	
End Project Longitude:		Project Manager:	
Priority Const. Site:		Site Discharging:	
Disturb ≥ 10 Acres:		Stormwater Sampled:	
Location Description:			
Comments:			

Complete one form for each Stormwater Discharge Point in a Turbid Discharge or Sediment Loss condition. Attach additional sheets as needed.

Site No.	County	MP or Station/Offset	Latitude	Longitude	Receiving Stream

Description of Noncompliance or Noncompliant Discharge:
Describe sediment that has left ALDOT Right of Way (location, affected water body, estimated amount, attached photos, etc.).

Cause of Noncompliance:
Show contributing rainfall amounts/intensities, failed BMPs, Contractor inattention to Needs Improvement citations, etc.

Period of Noncompliance:
Include exact date(s) and time(s) or, if not corrected, the anticipated time the noncompliance is expected to continue.

Corrective Measures:
List all proposed and/or ongoing corrections with a proposed compliance schedule (amount of sediment removal and BMP repairs, additions, and modifications, etc.).

Form C-37 (Field Worksheet)
Revised 03/13

Permit Number: _____ Inspection Number: _____

ALR Number: _____ Project: _____

Site No.: _____ Receiving Stream: _____

Sheet ___ of ___

Form C-38 (Field Worksheet)
Revised 11/11

Alabama Department of Transportation
Stormwater Turbidity Sampling Report

Permit Number: ______________________ Inspection Number: ______________________

ALR Number: ______________________ Project: ______________________

Analytical Method(s): EPA 180.1 Weather: ______________________

Sample Team Members: ____

1. If no sample is taken for a Primary Stormwater Discharge Point or Background Point, indicate the reason as Prior to Construction (PC), Insufficient Flow (IF), Hazardous Condition (HC), or Monitoring Suspended (MS). Details of a Hazardous Condition shall be documented. See guidelines and definitions in the Construction Manual.
2. A Turbidity Difference of 50 NTU or greater between a Primary Stormwater Discharge Point and its associated Background Point (i.e. flow-through waters) constitutes a Sediment Loss condition and a Form C-37 shall be completed.

Sample Point ID	Sample Taken[1]	If no, Reason[1] (PC, IF, HC, or MS)	Date	Time	Turbidity (NTU)	Turbidity[2] Difference (NTU)

Form C-38 (Field Worksheet)
Revised 11/11

Permit Number: _____ Inspection Number: _____

ALR Number: _____ Project: _____

Analytical Method(s): EPA 180.1 Weather: _____

Sample Team Members: _____

1. If no sample is taken for a Primary Stormwater Discharge Point or Background Point, indicate the reason as Prior to Construction (PC), Insufficient Flow (IF), Hazardous Condition (HC), or Monitoring Suspended (MS). Details of a Hazardous Condition shall be documented. See guidelines and definitions in the Construction Manual.
2. A Turbidity Difference of 50 NTU or greater between a Primary Stormwater Discharge Point and its associated Background Point (i.e. flow-through waters) constitutes a Sediment Loss condition and a Form C-37 shall be completed.

Sample Point ID	Sample Taken[1]	If no, Reason[1] (PC, IF, HC, or MS)	Date	Time	Turbidity (NTU)	Turbidity[2] Difference (NTU)

FORM C-40
Revised 1/12

ALABAMA DEPARTMENT OF TRANSPORTATION

MATERIAL SUBMITTAL

To: *(Project Engineer)*	From: *(Contractor, Phone No., Contact Person)*		Date:
			Subcontractor:
Project Number:	County:	Submittal Number:	Submittal: ☒ *NEW* ☐ *RESUBMITTAL*

Project Description:

TO BE COMPLETED BY CONTRACTOR			FOR ALDOT USE ONLY			
LINE ITEM NO.	SPECIFICATION SECTION PARA. NO. / PLAN SHEET NO.	DESCRIPTION OF MATERIAL *(Include Type, Model Number, Catalog Number, Mfg., etc.)*	Approved	Not Approved	See Comments	Initials

FORM QC/QA-1
Revised 1/12

ALABAMA DEPARTMENT OF TRANSPORTATION

SUMMARY OF INITIAL TEST RESULTS

Project Number:	County:	Division:
Contractor:		
Pay Item Number:	Mix Number/Range:	Contract Bid Price(per Ton):

Lot Number	Tonnage Placed	Asphalt Content		Air Voids		Mat Density	Gradation (420A Only)	* Referee Tests Needed?
		Number of Tests	Pay Factor	Number of Tests	Pay Factor	Pay Factor	Pay Factor	

* The Department to enter Yes or No.
If No, enter pay factors on QC/QA-3.
If Yes, indicate which characteristic, i.e., AC(asphalt content), AV(air voids), MD(mat density), or GD(gradation).
Example: Yes - AV. Where referee testing is required, use QC/QA-2.

Sheet No. ____ of ____

FORM QC/QA-2
Revised 1/12

ALABAMA DEPARTMENT OF TRANSPORTATION

SUMMARY OF REFEREE TEST RESULTS

Project Number:	County:	Division:
Contractor:		
Pay Item Number:	Mix Number/Range:	Contract Bid Price(per Ton):

Lot Number	Tonnage Placed	Asphalt Content		Air Voids		Mat Density	Gradation (420A Only)	* Final Comparison Satisfactory?
		Number of Tests	Pay Factor	Number of Tests	Pay Factor	Pay Factor	Pay Factor	

* The Department to enter Yes or No.
If No, consult ALDOT-380 in the Testing Manual.
If Yes, enter pay factors on QC/QA-3.

Sheet No. ____ of ____

FORM QC/QA-3
Revised 1/12

ALABAMA DEPARTMENT OF TRANSPORTATION

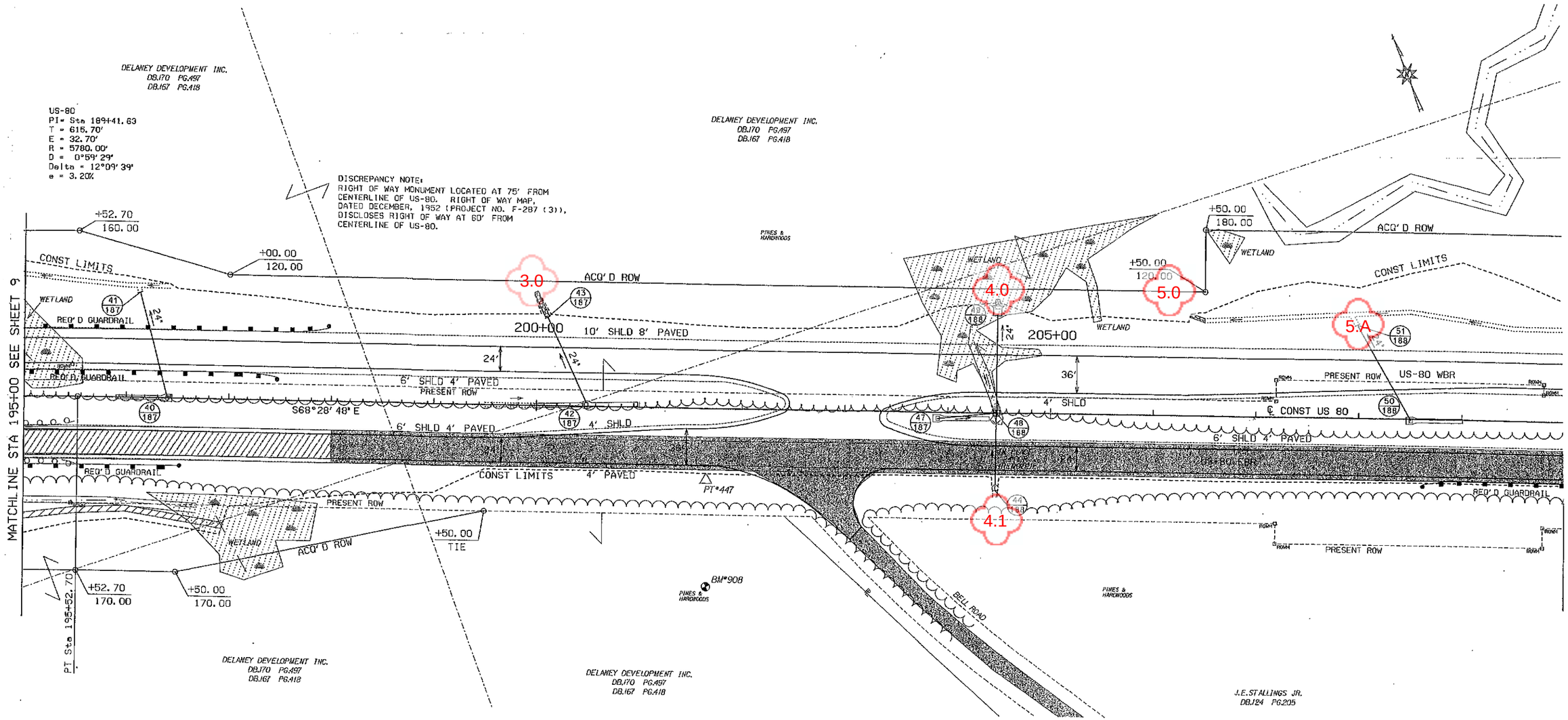
ASPHALT PAY FACTOR ADJUSTMENT WORKSHEET

Project Number:	County:	Division:
Contractor:		Estimate No.:
Pay Item Number:	Mix Number/Range:	**(c) Contract Bid Price(per Ton):**

Lot Number	(a) **Tonnage Placed**	Asphalt Content Pay Factor	Air Voids Pay Factor	Mat Density Pay Factor	Gradation (420A Only) Pay Factor	**(b) Lowest Pay Factor**	**(d) Adjustment (±)**
					Total (±)		**$**

$d = a \times (b - 1.0) \times c$

Sheet No. ____ of ____



IN PLACE PAVEMENT (RETAIN)

IN PLACE PAVEMENT (REMOVE)

CHANNEL LINING LEGEND

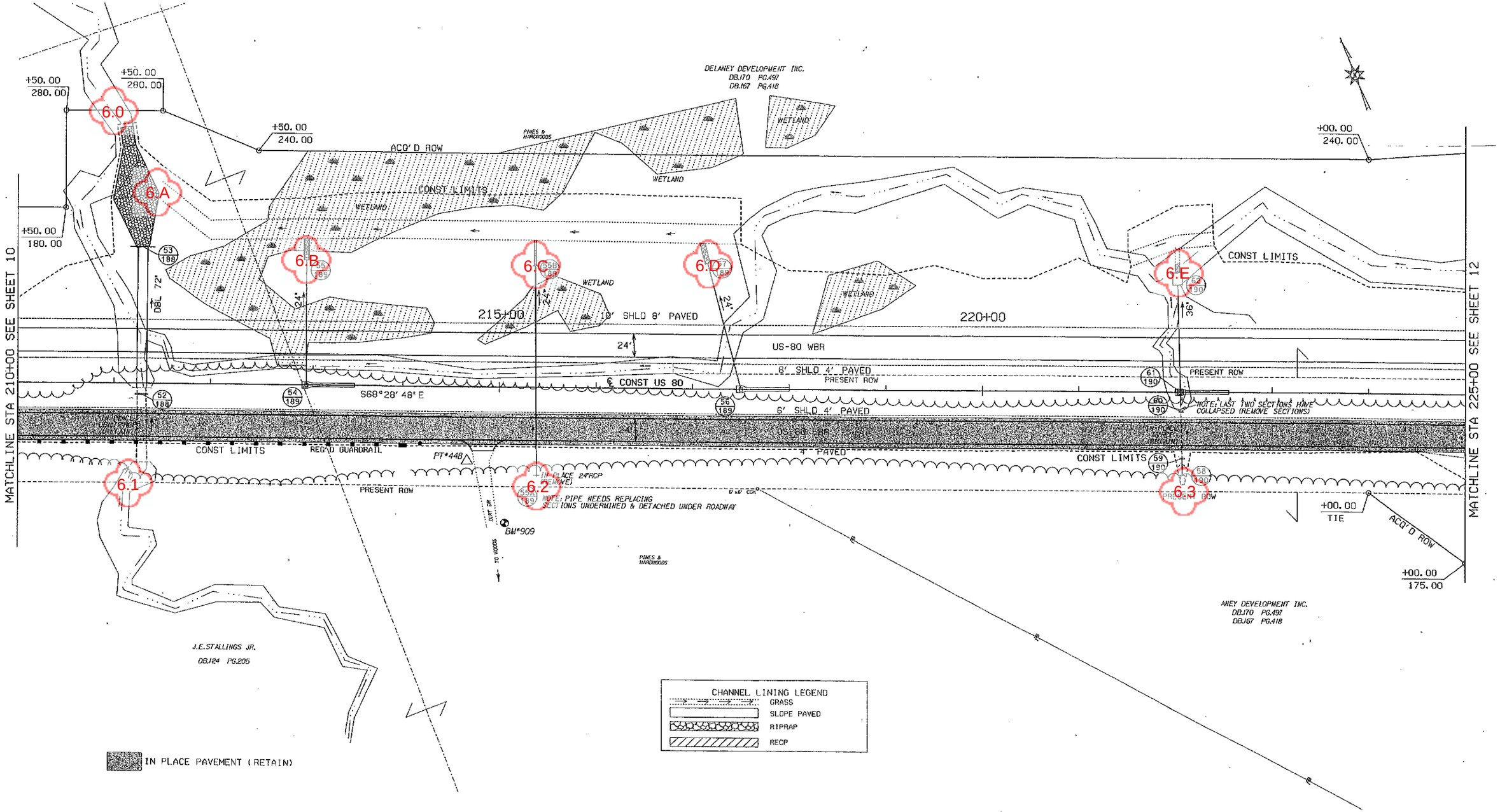
- GRASS
- SLOPE PAVED
- RIPRAP
- RECP

3.0 4.0 5.0 PRIMARY STORMWATER DISCHARGE POINTS

4.1 BACKGROUND POINT

5.A SECONDARY STORMWATER DISCHARGE POINT (Only label if discharging to a Water of the State)

0 50 100
SCALE IN FEET



6.0 PRIMARY STORMWATER DISCHARGE POINT

6.1 6.2 6.3 BACKGROUND POINTS

6.A 6.B 6.C 6.D 6.E SECONDARY STORMWATER DISCHARGE POINTS (Only label if discharging to a Water of the State)