EXCAVATION AND EMBANKMENT - Section 203

EXCAVATION

Excavation is designed for shaping the project, including cut sections. It includes the excavation of materials, both usable and nonusable, and the disposal of excess or nonusable materials for which provision is not made in other specification items. Specification Section 203 includes excavation for roadways, ditches, channels and structures, as well as all associated grading operations.

When hazardous materials, archaeological or paleontological remains, or endangered flora or fauna, or cemeteries are located or suspected, the project engineer will proceed as required in Section 201 and Section 202 in this manual, contract and plans.

EXCAVATION OUTSIDE THE RIGHT-OF-WAY

Excavation for lateral drains or other activities outside the right-of-way may require access to private property. If it is obvious that the contractor's forces require access to property not owned by the department, the project engineer must have possession of a written agreement from the owners of the property allowing access during construction. This agreement may be obtained by the Right-of-Way section prior to letting and may appear as the construction or drainage servitude on the plans. If such an agreement is not available, the project engineer is not to allow the contractor to perform any work that requires access to adjacent property until written permission is obtained. It is the responsibility of the department to obtain this agreement. The contractor will be provided a copy of the agreement. Prior to final acceptance of the project, the contractor shall obtain a written release from the property owner stating that the property has been restored to a condition that is satisfactory to the owner.

DISPOSAL OF EXCESS OR UNUSABLE MATERIALS

The disposal of unusable excavated materials shall be the responsibility of the contractor. If these materials are to be disposed on property not owned by the contractor, the contractor shall obtain a written agreement from the property owner, designating the type(s) and quantities of materials, to be disposed. A copy of this agreement must be provided to the project engineer before excavation operations begin. If excavated materials are to be stored on property owned by the contractor, the contractor shall provide the project engineer with a letter indicating the location and ownership of the disposal area and relieving the department of any responsibility. This agreement is also to designate the type(s) and quantity of material to be stored.

EQUIPMENT

The project engineer shall approve equipment used to perform general excavation. The equipment shall be in good condition with no fluid leaks that could be detrimental to the embankment. No equipment shall be used on the project that will cause damage to any area of the project, subsurface strata or hauling areas.

GENERAL EXCAVATION

General excavation is the excavation of materials from within the right-of-way, except for drainage or muck excavation. Materials that meet specification requirements and are approved for use may be used in the construction of the project.

UNDERCUTTING

Under cut materials will be paid under general excavation. Undercutting is the removal of materials discovered during construction operations that are not suitable to be left in place. The department will determine which materials are to be undercut.

DRAINAGE EXCAVATION

Drainage excavation is designed to remove water from the roadway area to natural drainage systems. It includes excavation for drainage beyond the limits of the roadway section, except for wing ditches at cuts. Wing ditches at cuts will be paid under general excavation. The contractor shall dispose of material from drainage excavation that does not conform to Specification Subsection 203.06 in accordance with Specification Section 202. If the contractor elects to use material obtained from drainage excavation in the embankment or in other project areas, it must be sampled, tested and evaluated by the department for conformance to Specification Subsection 203.06. Materials that conform to the applicable requirements of Specification Subsection 203.06 may be used when approved by the engineer.

Drainage excavation that is critical to keeping the work well-drained shall be done as soon as possible as directed by the engineer. Failure to provide and maintain adequate drainage can result in construction delays and additional work, because of the saturation and subsequent degradation of approved materials, yielding subgrades, additional processing of materials and other construction problems related to water standing on the project. The contractor shall correct construction problems caused by the failure of the contractor to construct or maintain adequate drainage at no direct pay.

MUCK EXCAVATION

Muck excavation refers to the removal of material that is not suitable to be left in place as foundation material. Muck excavation will be identified as such in the contract. The contractor shall remove muck from the area of the embankment and dispose of it in accordance with Specification Subsection 202.02. The contractor shall remove all material determined by the engineer not to be suitable to be left in place as foundation material.

EMBANKMENT

Embankment construction includes all work associated with the building of embankments for roadways, structures or other similar department projects.

Embankment Constructed With Usable or Lime Modified Soils

Earthen embankments must be constructed of usable soils, which may be obtained from excavation or borrow. All soil used in the embankment, regardless of source must be tested in its original location or in dedicated stockpiles by the district laboratory. The soil shall be classified by application of DOTD TR 423. Soils shall not be incorporated into the embankment until they have been approved for embankment use. Soil usage shall be as specified in Specification Subsection 203.06.

SOIL USAGE	P.I.	LIME TREATMENT
All soils used in embankments must have an organic content of 5% or less and a silt content of 65% or less according to the 2000 *Standard Specifications*. Always check the contract for the latest requirements.		
Headers (full height)	12 - 25	None Allowed
Embankment (non header) Height ≤ 8'	0 - 25 26 - 34	None Required 6% by Volume*
Embankment (non header) Height > 8'		
Below 8'	0 - 34 35 - 45	None Required 10% by Volume*
Above 8'	0 - 25 26 - 34	None Required 6% by Volume*
		*Treatment shall conform to Type E (Section 304)

SOIL USAGE TABLE - BASED ON 2000 STANDARD SPECIFICATIONS

SOIL BORING INFORMATION

Plans provided by the department may include the results of soil borings and the classification of soil materials within the right-of-way. **The department does not guarantee the accuracy of such information.** These borings are taken to establish the general character of area soils during the design phase of the project. They are not intended to provide detailed subsurface information for bidding or construction. **The contractor is advised to obtain independent samples and evaluate the subsurface material prior to entering a contract bid.**

SOIL QUALITY INSPECTION

If the department is satisfied with the subsurface soil information shown in the plans, the project engineer can allow the contractor to use material obtained from general excavation that meets specification requirements for embankment construction. However, such permission does not release the contractor or the inspector from observing the soil during construction. During construction, contractor personnel and department inspectors are to observe exposed soils for conformance to specification requirements. Should unanticipated materials or subsurface conditions be encountered, the inspector shall notify the project engineer and the district laboratory engineer immediately. The contractor shall cease operations in that area until the soils or subsurface conditions can be evaluated. Some examples of soils or conditions which will require department investigation include collapsible soils, perched water tables, high PI material, erodible material, muck, or any other material that is not acceptable for use in the proposed construction area.

Construction personnel must be aware that soil classifications and conditions are subject to change, even within close proximity to borings. When excavated material is to be used for construction, the quality and physical characteristics of this material are to be evaluated prior to its incorporation into the project. The department will perform additional testing at the project engineer's request.

SOILS WITH SWELL POTENTIAL

Soils with a high PI are indicative of soils with swell potential. Such soils will have a high clay content and may be sticky, hard to process and slickensided. The department has limited the use of such soils in embankment construction. Some soils that exhibit swell potential can be used with lime treatment. Refer to the Soil Usage Table, page 29.

BORROW

Generally, sources of material located outside the right-of-way will not be designated in the plans. If possible sources of local materials are designated in the plans, the quality of such material will be acceptable in general. However, material obtained from such sources must be sampled, tested and approved for its specific use. When material sources are designated in the plans, the requirements of Specification Subsection 106.02 will apply.

When material deposits are not designated in the project specifications, the contractor shall provide sources of material acceptable to the engineer. When the contractor

provides sources of materials or material deposits, the department may absorb the cost of processing samples to determine suitability of material.

Sources of soil needed for construction and not available from excavation for the project are referred to as "borrow." Borrow sources must be approved by the district laboratory engineer. It is the responsibility of the contractor to provide the department all information required by the latest policies and the *Materials and Sampling Manual* and this manual. **The contractor shall submit any request for sampling and testing to the project engineer a minimum of 30 calendar days prior to the anticipated date of needing borrow.** This request shall be in writing and shall identify the location of the proposed source. When the request includes a prospective pit, the proposed depth and type of excavation shall be specified. It shall also include a written agreement between the contractor and the property owner that allows department personnel access to the property. This written agreement with the property owner shall state that the contractor has agreed to purchase material from the owner if the material is approved for project use. The contractor shall obtain a separate agreement allowing department personnel access to property from each property owner through whose property access will be necessary. The contractor shall be responsible for clearing both the proposed site and access area to permit the easy entry of department personnel and equipment. The contractor shall survey and stake all corners of the proposed borrow pit and establish a base line. The request to approve the source shall include a drafted, detailed survey plat and a general area location plat. (Refer to page A-1 for an example of an acceptable pit sketch.) **The project engineer will ascertain that the contractor has complied with all department requirements before submitting the request to the district laboratory engineer. The department will not act on any request until these conditions are met**. **No material can be placed on any DOTD project until it has been approved by the department.**

The district laboratory engineer will notify the project engineer of the results of source sampling and testing. The project engineer will base the approval or disapproval of the proposed site on the findings of the district laboratory and will notify the contractor.

Borrow areas which will result in a depression cannot be located closer than 300 feet from any public right-of-way. No borrow area can be located closer than 300 feet from the bank of a stream listed on the National System of Wild and Scenic Rivers or the LA Natural and Scenic Rivers System.

Embankment Constructed With Aggregates

Nonplastic Embankment

Nonplastic embankment is generally constructed over unstable areas subject to subsidence. They are constructed of aggregates with a surcharge lift that is removed after the required design time has elapsed. This surcharge is designed to consolidate the underlying unstable materials by dewatering and moving the particles closer together. It is critical when constructing these embankments that, as the material is being placed in lifts, the unstable materials (muck) underneath do not become intermingled with the specification aggregates. Such contamination will immediately cause the loss of support value that the design demands. Such areas shall be

immediately corrected and construction operations modified to avoid any further occurrences.

Nonplastic embankments are constructed by mechanical equipment, first building a working table, then placing the aggregate in lifts. After building the working table to the satisfaction of the engineer and in accordance with the contract and plans, each lift shall be constructed in accordance with general construction requirements for embankments.

This type embankment is constructed using sand, shell, stone, or blended calcium sulfate. When blended calcium sulfate is used, certain chemical characteristics must be considered. Special test equipment and modified operations as listed below are necessary while constructing embankment with this material.

- The material must be transported and processed in the damp state to avoid dusting. Dust from this material may create a hazardous air pollution situation.
- The lift thickness is modified.
- When determining moisture content (TR 403) for moisture control and density testing, the sample must be dried for a minimum of 24 hours at 140^{o} F in a forced draft oven. This material changes in characteristics when overheated; therefore, a lower temperature for a longer period must be used.
- This material requires a plastic soil blanket for environmental purposes and support of vegetation.
- The material cannot be placed within 10 feet of a metal structure due to corrosion potential.
- The material must be blended with an approved aggregate that will control the pH.
- The Materials and Testing Section must approve the quality control plan.
- All materials shall be from approved sources.
- Environmental clearance must be obtained from the Department of Environmental Quality.

PLASTIC SOIL BLANKET

When soils with a P.I. less than 10 or a pH less than 5.5 or greater than 8.5 are used in embankment construction or form the final surface of a cut slope, the slopes of the embankment must be protected with a plastic soil blanket conforming to Specification Subsection 203.10. Soils with a P.I. less than 10 are highly erodible and, therefore, cause immediate and severe loss of material and do not easily develop a vegetative cover. Soils with a pH less than 5.5 or greater than 8.5 will not support appropriate vegetation cover. Thus when either of these conditions occur, both cut and fill slopes must be protected. Embankment material will be sampled in-place by project personnel and tested by the district laboratory to determine the need for a plastic soil blanket.

The plastic soil blanket must be able to support vegetation and will usually be seeded with an approved grass to provide temporary and permanent erosion control. For approved grasses, refer to Specification Sections 204 and 717. If the plastic soil blanket will not support vegetation, the contractor shall remove and replace the material or treat the material as necessary.

On slopes when the material has a P.I. greater than 10, but has a pH less than 5.5 or greater than 8.5, in lieu of placing a plastic soil blanket on the slopes, the contractor may treat the slopes to bring the pH into the range of 5.5 to 8.5. When the pH is above or

below these values the Roadside Development Section will be contacted to provide the appropriate treatment. The modified soil will be sampled by project personnel and tested by the district laboratory to determine the acceptability of the pH value.
Plastic soil blanket shall be placed in lifts of uniform thickness and compacted with a cultipactor. There shall be no low spots, voids or lumps in the completed blanket. Plastic Blanket material shall be evenly distributed. The minimum thickness of the completed blanket shall not be less than 12 inches. The plastic blanket shall be finished to a well-drained surface, so that water will neither reach the underlying materials nor stand on the surface.

STABILIZATION WITH GEOTEXTILE FABRIC

Areas of unstable foundations may require stabilization with geotextile fabric. This requirement will be shown on the plans. Geotextile fabric is designed to prevent the intermingling of usable embankment material with underlying unstable material. It helps distribute the load from overlying material onto a less structurally sound layer. To be effective, the geotextile fabric must form a complete barrier. Therefore, it is critical that the fabric be protected from deterioration before and during placement. Ultraviolet damage, tears, failed seams, improper installation in curves, and other similar defects can lead to premature failure of the embankment.

Geotextile fabric shall not be unwrapped prior to use and shall be spread directly in front of the operation. Geotextile fabric exposed to sunlight prior to installation will be tested for ultraviolet damage prior to placement. Geotextile fabric that has been installed shall be covered with embankment within seven calendar days. Installed fabric that is not covered within seven calendar days shall be removed and replaced or protected from further light damage until test results are obtained.

The specifications allow the joining of geotextile fabric to be overlapped or sewn. When soil is inundated with water or saturated the fabric must be sewn. When edges are sewn, Specification Subsection 203.11 requires the use of the ***J***-Stitch with a Type 401, two-thread chain stitch. To create a ***J***-Stitch, two parallel edges are placed together, turned in the same direction and sewn. The appearance of the turned and stitched fabric looks like the letter "J," hence, the name. Refer to the diagram on page A-35 in the Appendix for a sketch of a completed ***J***-Stitch. Although there is no specification for the amount of material to be turned when making the ***J***-Stitch, industry standards recommend two - four inches of overlap. The number of lines of stitching required shall be in accordance with the plans or as directed by the Design Section. The two-thread chain stitch looks like interlocking Figure-8's on the bottom. The 401 stitch is a locking stitch which protects the seam from unraveling if a thread breaks. Specification Section 203 requires thread of polyester or kevlar. These materials are resistant to moisture damage.

EQUIPMENT

Equipment weight and construction methods shall be compatible with soil conditions at the time of construction. The equipment shall be in good condition with no fluid leaks that could be detrimental to the embankment. No equipment shall be used on the project that will cause damage to any area of the project, subsurface strata or hauling

areas. Equipment shall be capable of producing a uniform surface, density and moisture content for the full cross section and depth of the area being constructed.

Vibratory compaction equipment shall not be used in areas of excessive moisture, perched water tables, where underlying courses have not been compacted with vibratory equipment, or where the compaction characteristics of the soil are not compatible with vibratory compaction. (For example, soils with high silt content are not readily compacted with vibratory equipment.) When the use of vibratory equipment results in damage to the embankment or underlying support layers, the use of this type of equipment shall be discontinued immediately. The contractor shall correct damage caused by the improper use of vibratory compaction equipment, as directed, at no direct pay.

QUALITY ASSURANCE (QA)

The specifications delineate different conditions, based on embankment height and type (fill or cut section), which regulate the preparation of the existing ground, placement and compaction of soil for an embankment. The details of embankment construction are so varied and complex that personnel from the department and contractor must refer to contract, plans, and *Materials Sampling Manual* for specific requirements. QA requirements for sampling, testing, and documentation will generally be found in the Materials Sampling Manual.

The table on page 35 illustrates the complex details that personnel must be aware of to construct an embankment according to the department's requirements. This table outlines the different situations and requirements for preparing the existing (natural) surface of the ground before actually starting embankment construction.

EMBANKMENT HEIGHT	PREPARATION
Fill	
< 5 Feet	Remove heavy sod & objectionable vegetation. Before usable material is placed, scarify existing ground to 9" depth. Recompact to a minimum of 95% of maximum dry density.
□≥ 5 Feet	Before usable material is placed, scarify existing ground, then recompact satisfactorily.
Cut	
* Cut Surface	The top 12 inches of any cut section shall be processed by scarifying and compacting the exposed soil. The soil shall be compacted to the requirements of general embankment construction to achieve 100% payment density in base course above. When the soils encountered are unstable the material shall be undercut and removed as directed by the engineer or contract and plans. Usable soils placed in lieu of the undercut material shall be placed, processed, and compacted in accordance with general embankment construction to achieve 100% payment density in base course above. When stable soils cannot be reached, embankment materials will be bridged in and embankment meeting the requirements for general embankment construction will be constructed on top of the cut area to achieve 100% payment density in base course above.
Existing Roadbed Within Two Feet of Finished Subgrade	
	Scarify to at least 9" depth. Recompact to at least 95% of maximum dry density.
* For direct placement of subbase or base course only.	

EXISTING SURFACE PREPARATION FOR EMBANKMENTS, SUBBASES AND BASES

BASED ON 2000 STANDARD SPECFICATIONS

TRANSITIONS FROM CUT TO FILL

Transition zones between cut and fill sections are traditionally unstable areas that lead to premature failures. In order to ensure a smooth transition and to minimize the instability of the transitional area, the cut section should be extended for the full width of the embankment into the area to be filled to a point where the embankment fill height will reach full depth or at least three feet, whichever is less. The sloped area of the transition of the cut is the most critical. This slope should be at a ratio of approximately 1:1 or cut in steps in accordance with Specification Subsection 203.07. The engineer will determine the construction to be used, based on field conditions, fill and cut heights and depths, and material qualities. However, it is recommended that required additional excavation be limited to 50 feet on each side of a transition point. The intent of this construction technique is to eliminate the placement of only a thin edge of embankment material caused by the featheredging of the fill into the cut area. In areas of low relief, the project engineer will make whatever modifications are necessary to this technique to ensure a stable transition from cut to fill. Refer to the sketch on page A-13.

QUALITY CONTROL (QC)

The contractor is responsible for supplying materials and using construction methods and equipment that will produce a project which uniformly meets all specification requirements. The contractor shall employ personnel who are knowledgeable about embankment construction, including soils identification, layout, traffic control, plan reading, and testing, and are capable of controlling the work to conform to the plans and specifications. **Although a certified DOTD inspector will be present on the project, it remains the contractor's responsibility to recognize deficiencies in materials or construction and to take corrective action**.

Each lift of material is to be uniformly blended by a mixing process approved by the engineer. Blending shall ensure that the material is uniform for the full thickness and width of the lift. Blending may be accomplished by using a in-place mixer, disking, the use of a motor patrol, or equipment designed to pulverize and blend soils. The in-place mixer is the most effective for vertical blending of material. **The use of a sheepsfoot roller is not an approved method for blending soils.** Any of the techniques mentioned can be effective in blending material vertically; however, to properly blend material across the roadway, special techniques may be required. Equipment used to spread material across the roadway (e.g., motor patrol) is **not** effective in blending material throughout its depth; however, is very effective at moving material across or up and down roadway..

The specifications establish a moisture content tolerance that must be met during compaction. This tolerance is based on the optimum moisture content established by the department for each section per lift. After the contractor has placed and uniformly blended the material, construction personnel will sample the section and determine the optimum moisture content prior to compaction. Additional samples may be required if material is not uniform as placed longitudinally in the section or if areas within the section are processed at different times. Optimum moisture content will be determined in accordance with DOTD TR 415 or DOTD TR 418. **Moisture content is to be uniformly maintained within the specification tolerance (-2 to +4) of optimum and is to be matched to the characteristics of the soil being compacted.** For example,

the moisture content of a coarse, sandy soil is critical for compaction purposes. Therefore, if the contractor maintains a coarse sandy soil at +4.0 of optimum moisture content, it may be impossible to meet specification density.

The contractor shall test embankment materials in-place for moisture content prior to compaction during processing. This test is to be in accordance with DOTD TR 403. The materials are to be within the specification range of -2.0 to +4.0 of the optimum moisture content when compaction is begun and remain within this range throughout compaction. The contractor is to conduct moisture content testing in accordance with DOTD TR 403 as necessary during compaction to ensure that the material remains within this specification requirement until compaction is complete. **Moisture content obtained by nuclear device during density testing is not allowed for this control process**. If the material is not within this range or is not uniform, the contractor is to make adjustments to conform to this specification or discontinue compaction operations. This range is the maximum deviation from optimum moisture content allowed by the specifications. The contractor is to maintain embankment materials at a uniform moisture content. Variations in moisture content may cause the constant adjustment of compactive effort. Material that has been compacted at other than this moisture content tolerance is to be reprocessed at the proper moisture content and recompacted. When the material is below the -2.0 tolerance, additional water shall be added to the material after it has been scarified. The material shall then be uniformly blended to ensure uniform moisture throughout. The addition of water to the surface of the compacted section without reprocessing will not be allowed. If the material is above the +4.0 tolerance, it shall be aerated until it is within specification tolerance for moisture content, then recompacted.

During the placement of embankment fills, the contractor is to check the thickness of each lift at random locations to ensure that the maximum loose thickness per lift is not being exceeded. For cuts, the contractor is to check the top layer to ensure that it has been prepared to the correct depth and width and compacted to at least the minimum density required by the specifications.

During embankment construction, the contractor is to check density in accordance with DOTD TR 401 to ensure that specification density requirements are being met. **The department's acceptance tests are not to be used for control.** If a proctor is to be used to determine the maximum dry weight density, the material to mold the proctor will be obtained from underneath the nuclear device at the location where the density test is taken. If a sand cone is used in place of the nuclear device, the material for the proctor shall be taken from the material surrounding the hole.

The contractor is to routinely check each section for alignment, grade and cross slope. Deviations from the plans are to be corrected prior to requesting inspection of the section by the department.

INSPECTION AND ACCEPTANCE

Prior to placement, all soil will be sampled, tested, and approved for use. During the placement of embankments, project personnel are to check the thickness of each lift at random locations to ensure that the maximum loose thickness per lift is not being exceeded. For cuts, project personnel will check the top layer to ensure that it has been prepared to the correct depth and width and compacted to at least the minimum density

required by the specifications. The inspector will visually inspect the processing operation of the surface being prepared for embankment, subbase or base course placement, as well as the processing of fill material. Samples and tests for optimum moisture content, actual moisture content or density will not be taken until the material is blended thoroughly and to the satisfaction of the inspector.

The department will test the material for moisture content during processing prior to beginning of compaction. If the material is not within the specification tolerance (-2.0 - +4.0), the contractor will be required to reprocess the material before beginning compaction. Additional acceptance testing will be performed for moisture content in accordance with the frequency stated in the *Materials Sampling Manual* or as necessary to ensure that the moisture content of the material is uniform, within specification requirements, and matches the compaction characteristics of the material being compacted. When acceptance tests indicate that the material is not within specification tolerances, the contractor will be required to reconstruct the area represented by the test at the proper moisture content. Acceptance tests for moisture content are to be taken at the beginning of the compaction process to verify the contractor's quality control program and the conformance of the material to specification requirements. Acceptance tests for moisture will be performed in accordance with DOTD TR 403. **Moisture content obtained by nuclear device during density testing is not allowed for this process**.
After compaction, the inspector will inspect the section carefully prior to taking any density tests. The section must meet the inspector's approval prior to acceptance density being performed. It is to be noted that the acceptance of the embankment is not based solely on the results of the density tests. The embankment material must be uniformly mixed
and compacted with a uniform compactive effort and at a uniform moisture content within specification tolerances. The inspector will look for deficiencies such as pumping, differences in texture, laminations, cracking, nonuniform moisture content (dry/wet areas), nonuniform mixing, movement under traffic, rutting, etc. Deficiencies identified by the inspector by visual observation are to be corrected by the contractor before the acceptance density test is performed. The inspector is also to check the section for alignment, grade and cross slope prior to final acceptance of the section.

The embankment is to be tested for conformance to density requirements in accordance with DOTD TR 401. Acceptance testing will be performed after the contractor has completed QC testing and has notified the inspector that the section is ready for acceptance testing. If a failing density test occurs, the section is to be reprocessed by the contractor at no direct pay. If a proctor is to be used to determine the maximum dry weight density, the material to mold the proctor is to be obtained from underneath the nuclear device at the location where the density test is taken. If a sand cone is used in place of the nuclear device, the material for the proctor is to be taken from the material surrounding the hole.

When acceptance tests indicate that the contractor has not controlled the process to meet any specification requirement, the chief inspector and/or project engineer is to evaluate the contractor's QC effort and require modifications to ensure improved quality control.

VISUAL INSPECTION

Visual inspection is the most important part of the department's quality assurance program. It is the department's intent that courses be uniform and meet all specification requirements. The minimum testing requirements of the statistically based acceptance program reflect actual values of small, specified areas. Therefore, it is always mandatory that a strong visual inspection program be established and maintained during the construction process to guarantee that these acceptance tests do, in fact, represent a uniform product. Prior to final acceptance, the inspector will visually inspect the entire section. If visual inspection shows that the course is not uniform or that the test values may not be representative of the entire section, additional tests may be performed and deficiencies shall be corrected. **Deficiencies identified by visual inspection, such as laminations, dimensional deficiencies, soft areas, etc. shall be corrected before the section will be accepted. The section must be accepted prior to the placement of the next lift.**

QUALITY ASSURANCE DOCUMENTATION

The contractor shall document the QC program and tests as required by this manual, the *Materials Sampling Manual,* and the Quality Control Plan approved by the Project Engineer.

Project personnel will document construction progress, inspection, and acceptance testing in a field book in accordance with standard department practice. Thickness, width, grade, and cross slope will be particularly noted. Sections and lifts are to be numbered for easy identification. Each test is to be identified by a descriptive numerical system that includes the project number, section number, lift number and test number. When failing tests occur, a letter designation should be used for any additional tests taken in that section to correlate them to the initial failing test.

Density & Moisture Content Worksheet

The test procedure DOTD TR 401 - The Determination of In-Place Density, contains a worksheet to be used to facilitate the calculations associated with the determination of density, moisture, and pulverization. This worksheet is to be completed in conjunction with this procedure and used for these calculations. Department personnel will submit this form for acceptance testing regularly to the district laboratory for MATT system entry. The district laboratory will return the original to the project engineer for inclusion in the 2059 Review. A copy of the documentation of QC tests and results shall be given to department personnel.