

SECTION 600 – ANCILLARY CONSTRUCTION

Access Control Issues. During the course of a construction project, issues of access or access control may arise. Issues involving access control or encroachment on to the State Right-of-Way must be handled in accordance with Administrative Policy A-12-01, and the current version of the *Access Management: Standards and Procedures for Highway Right-of-Way Encroachments* manual maintained by the Department's Right-of-Way Section.

All changes to an approach or driveway with respect to width, location, or allowed use must be addressed on the [ITD-0606](#) form prior to construction or documented during project closeout by having District Right-of-Way record the changes in the appropriate documents.

Questions should be directed to the District Traffic or Right-of-Way sections, or their headquarters counterparts. All changes that do not meet the requirements of *Administrative Policy A-12-01* must have the Chief Engineer's approval. Additionally, FHWA must give approval for any changes involving the Interstate access. The Construction/Materials or Design/Traffic Sections can help facilitate this coordination.

All issues involving access control or encroachment on to a local right-of-way must be handled in accordance with the local entity's (county, city or highway district) policy, and should be directed to the local entity for resolution.

If increases or decreases in costs are involved in the changes, a change order must be prepared. All changes must be noted on the "as constructed" plans and in the appropriate right-of-way documents.

Additions and Removals to Landowner Facilities. The addition or removal of pipes, fences, ditches, minor structures, or similar features shall be covered by a supplemental right-of-way agreement and, if necessary, a change order. If a fence, gate, or similar item is not installed, the material cannot be given to the landowner.

601.00 Conduits, General

Pipe Lists and Ordering. Since most contracts now involve contractor surveying, the Engineer should verify that the Contractor is preparing pipe lists in accordance with ITD Standard Specifications for Highway Construction (SSH) [Subsection 106.02](#). In the rare event that the surveying is performed by the Department (or Owner's representative), the Engineer should prepare and furnish to the Contractor the corrected list of pipe sizes and lengths at the earliest opportunity, thus avoiding a late delivery and delaying the progress of the work.

Ensure care is exercised in preparation of the pipe list. The list should be prepared from the field stake notes for installation and not from information taken from the plans, which are only an estimate. Installations, such as siphons, that require special fabrication at the plant for elbows and bends must have an accompanying line sketch showing the exact dimensions and angles needed. Copies of the pipe list should be retained by the Engineer.

The adjacent landowner should be contacted, if possible, to assure that the irrigation and drainage facilities planned will fit the landowner's operation after the construction of the project. The direction or method of irrigation may have changed since the design was completed. The right-of-way agreements must be checked to ensure that requirements coincide with the plans. Supplemental agreements may be necessary to effect changes that are advantageous to the owner and the Department.

Staking. At the time the pipe list is made up, pipes should be completely field staked. Staking may not always be done at this time; but if the Contractor's operations can accomplish the staking, it is advisable to do so. Many different methods are used to stake pipe. Generally, an offset line is used showing the alignment of the pipe and a grade reference from this line to the flow elevation of the pipe. Short pipe may only require end offset points for alignment with a grade reference.

Another method for staking pipe involves a set of field notes showing what was staked with space provided on the same notes for the installation inspector to record the re-measure dimensions for excavation and backfill. This consolidation of field data simplifies the computation of quantities for final payment. On projects where an exceptionally large amount of pipe is to be used, the Contractor or the Engineer may create a field form that would include all original field data and subsequent inspection data.

Inspection. Pipe should be inspected in the field, and rejection due to damage or manufacturer's defect is the responsibility of the field inspector. Remember that as pipe is delivered to the project, it will be handled many times and may become damaged. Thoroughly inspect each length of pipe, making sure that it is the type called for on the plans and that no defects exist. Special attention should be given to bituminous-coated pipe for uniformity in coating and scuffmarks. Concrete pipe should be checked for roundness and cracking from transit. Rubber gaskets used with concrete pipe must be examined to ensure that the gaskets are of the proper size and quality.

Pipe will be certified as outlined in the [Quality Assurance Manual](#). Do not overlook the inspection of the gasket and gasket lubricant for conformance to specifications.

Check all pipeline installations for alignment and grade. Each joint shall be checked for proper fit, the presence of a gasket, proper alignment, and that it forms a good seal.

All trenches are susceptible to dangerous cave-ins. Be aware of Occupational Safety and Health Administration (OSHA) requirements and avoid unsafe practices. Various methods of shoring can be employed. On deep trenches, a movable metal box may be pulled along through the trench with the complete operation of placement being carried out (i.e. fine grading, pipe placement, backfilling, and tamping). If a deep trench has sheeting, the sheeting should be withdrawn gradually as the backfill is placed and contact with the trench walls is gradually established.

The Contractor is solely responsible for trench safety.

Backfill should be placed on both sides of the pipe in even lifts so as to avoid pushing the pipe out of alignment. Large size granular backfill should be placed so that the fill does not drop directly on the pipe and cause impact damage. Special protection should also be given to trenches in urban sections that are left open for any period of time. Proper signing, delineation, and barricades must be erected to make the public aware of the potential danger.

Every cable, pipe, tube, or any significant object that the trench intercepts shall be recorded with the following information: description (e.g., type/function, size,), stationing, depth (i.e., from a reference datum), and what the Contractor did to protect or support the object. If the service of a disturbed line is stopped due to trench excavation, the Contractor should immediately undertake the necessary action to restore service. Applicable information should be added to the as-constructed plans.

Some projects call for the same size of metal pipes at different locations with different thickness (gauges). Generally heavier thickness is because of higher fills, but the needs for a heavier thickness might also be due to soil pH or the pH of the water being transported. Be sure to get the right pipe in the right location, and check with the Resident Engineer before changing a pipe thickness.

Documentation for Pay Quantity. On projects containing a large number of conduits, the Department office staff should maintain a check sheet for all conduits on the project. The location and size can be entered with a subsequent entry showing the final quantities. The procedure simplifies the total inventory of conduit and will preclude any duplication of payment.

All conduit stake notes and computations should be kept in a logical sequence for ready reference and verification. A little time spent setting up good conduit records greatly contributes to the accuracy and ease of work later.

Complete field notes and survey records of the original ground and final re-measure are essential for computing the actual quantities of structure excavation and compacting backfill. Good coordination must exist between the survey crew and the installation inspector.

Estimated quantities may be used for backfill and excavation prior to the final measurement and computation for quantities. These entries, in both the diary and ledgers, should be shown as estimated quantities.

The diary will also be used to verify the activity, date, and work location.

Reports. Report compaction of backfill on the [ITD-0850](#) form, Nuclear Density and Compaction Report for Soil and Aggregate.

602.00 Culverts.

General. The specifications for installation of pipe are intended to provide a lasting and well-designed conduit. The designer cannot foresee special problems that may result after a trench is excavated. Foundations should be carefully examined and unsuitable foundation material removed. Unsuitable materials include but are not limited to: construction debris, organics or other soft soils, oversized rocks, and frozen material. Removal is shown on the [standard drawing](#).

During the backfilling operation, the inspector must verify the required density of the backfill by compaction tests as required by the minimum testing requirements. Tests may only be omitted when some other special means of compacting backfill is approved and used. Adequate hand tamping of the backfill material under the sides of the pipe is very important. Pipe may be damaged, after the project has been completed, by settlement of the backfill.

Uniformity of the bedding grade is usually checked with a reference string line pulled parallel to the bed prior to pipe placement. Careful inspection of the bed shall insure that no large rocks are embedded in the graded surface. Rocks just below or at the surface of the bed may act as point bearing and damage the pipe causing subsequent leaking or failure.

As soon as the inspector has approved the pipe bedding, the structure excavation and compacting backfill measurements should be taken. Re-measurement should be completed prior to placement of the foundation material.

The additional weight of hoisting equipment next to an open trench may create a safety hazard and shoring may be required. Whenever an unsafe condition is discovered, advise the Contractor and stop all applicable work until the situation is remedied. Sandy, supersaturated soils are particularly susceptible to sudden cave-ins.

Placing Corrugated Metal Pipe. The inspector shall make certain that the rivets or bolts on the joint band angle iron are not pulled through the band due to excessive tightening. Each band must be tight and the pipe ends butted together for a corrugated metal pipe to function properly. Be sure, in the case of metal culverts, that a pipe of the proper thickness (gauge) is being installed. A common practice is to install pipe prior to earthwork operations and then allow vehicles to travel over the pipe. A pipe placed in this manner is susceptible to crushing due to heavy loads. The inspector should check all pipes to ensure that they are in their original undamaged condition at the completion of earthwork operations.

Bituminous-coated corrugated metal pipe will often be scuffed during handling. After the coated pipe has been placed, the scuffed areas shall be coated with hot penetration grade asphalt. Additional applications may be necessary to achieve the required coating thickness. The bituminous coating on pipe bands must also be inspected to ensure full coverage.

Placing Concrete Pipe. After fine grading, the pipe bed must have depressions dug out for the pipe bells. The pipe must lie on the bedding along its length with the exception of the depressions for the bells. The pipe must **not** be supported at the bell. The inspector must make sure that the bell is clear of the ground after the connection is made to the next length of pipe.

Reinforced concrete pipes of larger dimensions are stress-oriented using elliptical or double-line circumferential steel for reinforcement. According to the placement of this steel, the pipe is marked for the top and bottom alignment. These marks must lie in a vertical plane.

Occasionally, while placing reinforced concrete pipe of 24 inches diameter or less, a bell will be somewhat tight for the spigot. The Contractor, in forcing the joint together, may cause hairline cracks in the bell that are parallel to the length of the pipe. The Contractor should advise the materials supplier of the condition, and the pipe may be subject to rejection. This condition may be detrimental to pipes that are under pressure, such as siphons or irrigation lines.

Rubber gaskets require care in fitting. The gasket must be fitted properly in order to obtain tight joints. To ensure good fitting joints, keep gaskets and joints clean. A very small amount of soil will greatly inhibit proper installation. Lubricants (e.g., flax soap, bentonite, vegetable soaps) as recommended or supplied by the pipe manufacture, are used on the joints. Petroleum products are **not** permissible for joint lubricants.

Documentation for Pay Quantity. On projects containing a large number of pipes, the Engineer should maintain a check sheet for all pipes on the project. The location and size can be entered with a subsequent entry showing the final quantities. The procedure simplifies the total inventory of pipe and will preclude any duplication of payment.

All pipe stake notes and computations should be kept in a logical sequence for ready reference and verification. A little time spent setting up good pipe records greatly contributes to the accuracy and ease of work later.

The length of the culvert shall be confirmed by measurements and noted in the diary or pipe notes. Payment shall not be made for lengths greater than approved by the Engineer. Quantities must be measured and reported to the nearest foot. Compacting backfill and structure excavation is paid on the basis of quantities calculated from cross-sections and in accordance with CA [Section 210](#).

When the culvert ends in a headwall or minor structure, the back of the headwall will be the outer limit for payment of structure excavation and compacting backfill. Excavation for pipe outside of the roadway prism will be paid for as structure excavation the same as within the roadway prism, unless otherwise specified.

Complete field notes and survey records of the original ground and final re-measure are essential for computing the actual quantities of structure excavation and compacting backfill. Good coordination must exist between the field survey crew and the installation inspector.

Estimated quantities may be used for backfill and excavation prior to the final measurement and computation for quantities. These entries, in both the diary and ledgers, should be shown as estimated quantities.

The diary will be used to verify the activity, date, and work location. Quantities and final measurements will also be documented by diary entry.

Reports. Report compaction of backfill on the [ITD-0850](#) form, Nuclear Density and Compaction Report for Soil and Aggregate.

603.00 Pipe Siphons.

Placing Pipe Siphons. The information in [Section 602](#), Culverts, applies to siphons as well. Siphons are usually trenched into steep back slopes. After initial hand tamping along the pipe and bed contact zone, compacting backfill may be performed on horizontal lifts if the slope is too great for parallel-to-bed lifts.

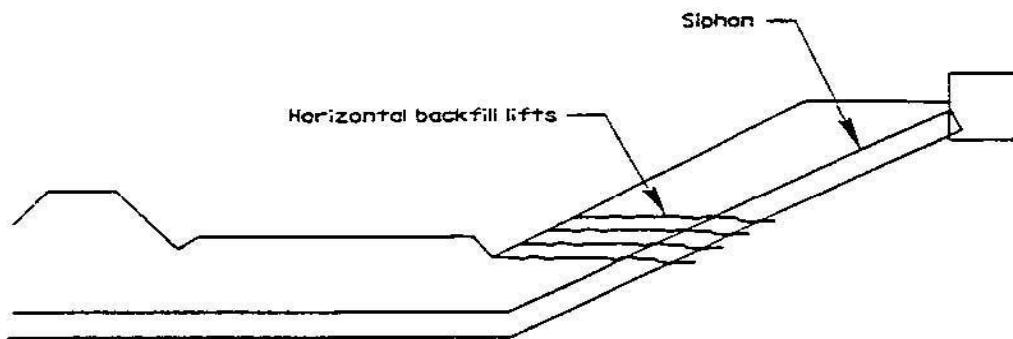
The importance of sealing the inlet and outlet cannot be overemphasized. Water escaping at these locations invariably follows the outside of the pipe down into the roadway. This condition not only causes washing around the pipe, but also may lead to excessive moisture in the roadbed at that location. The condition may compound itself by frost heaves or softening of the travel way and cause failure. Compaction at these locations is especially critical. The entire length of the siphon right and left of the roadway prism shall be backfilled with specified material. Siphon headwall wings and aprons require special care; the length of the wings and depth of the apron should be extended, if needed, to prevent washing out. Dense soil should be compacted around the headwall to provide additional sealing against water penetration.

Be sure, in the case of metal siphons, that the proper thickness (gauge) of pipe is installed.

Testing Siphons. The entire length of the siphon should be left exposed until the siphon has been tested. After filling the siphon with water, the inspector must examine the pipe for leaks. Some seepage through the pipe walls will occur on concrete pipe but will usually cease after soaking awhile. Pouring a reinforced concrete collar may repair joint leakage.

Documentation for Pay Quantity. Documentation for Siphons is similar to Culverts. See CA [Section 602](#).

Reports. Report compaction of backfill on the [ITD-0850 form](#), Nuclear Density and Compaction Report for Soil and Aggregate.



Backfill of Siphon Section in Back Slope

604.00 Irrigation Pipelines.

Placing Conditions. Placement of irrigation pipe must conform to the placement requirements for culverts per CA [Section 602](#). Compaction of the backfill material placed within the roadway prism (i.e., between cut or fill catch points) shall be as specified for culverts. Backfill outside the roadway must be compacted by puddling, tamping, or rolling in a competent manner even though no percent of compaction is specified.

Puddling is the orienting of soil particles into a dense position by the use of water. Use of this method is particularly advantageous around minor structures since the puddling action will occur when the facility is placed in operation. Be sure, in the case of metal pipelines, that the proper thickness (gauge) is installed per CA [Section 601](#).

Testing Line. Corrugated metal pipe irrigation lines generally have greater leakage than concrete pipelines, so before the pipeline is accepted, the pipe must be tested for leaks. Leaks must be located and repaired in a satisfactory manner before approval. The inspector must personally supervise the test and maintain a close check on the progress of the test.

Concrete pipe will absorb water and many small cracks will close up. Special care should be exercised in the protection and care of irrigation pipelines during construction. Concrete lines are especially susceptible to crushing or breakage due to the lack of metal reinforcement in them. The Contractor must be advised to keep heavy equipment away from irrigation pipelines after installation. Risers or outlets should be clearly marked to avoid damage.

Documentation for Pay Quantities. Documentation for irrigation pipe lines is similar to Culverts per CA [Section 602](#).

Reports. Report compaction of backfill on the [ITD-0850 form](#), Nuclear Density and Compaction Report for Soil and Aggregate.

605.00 Sewers, Manhole and Valve Covers.

General. Placement of sewer lines, manholes, catch basins, and inlets must conform to the placement of culverts and siphons. Excavation and backfill must be as discussed in CA [Section 602](#), Culverts. During the placement of a sewer line, severe ground water conditions are often encountered. Many times, little or no space is available to perform dewatering operations. Whenever possible, the pipe should be installed when the ground water level is at its lowest elevation. Sewer line placement under adverse conditions requires extra care to ensure proper gasket installation.

Manhole connections may be made by laying the pipe continuously through the manhole location. The manhole base is then placed. After the base is cured, the pipe is broken out to provide access to the line. All broken masonry must be removed and irregular edges grouted. It is also permissible to form an invert in the manhole base rather than laying pipe through the manhole if desired.

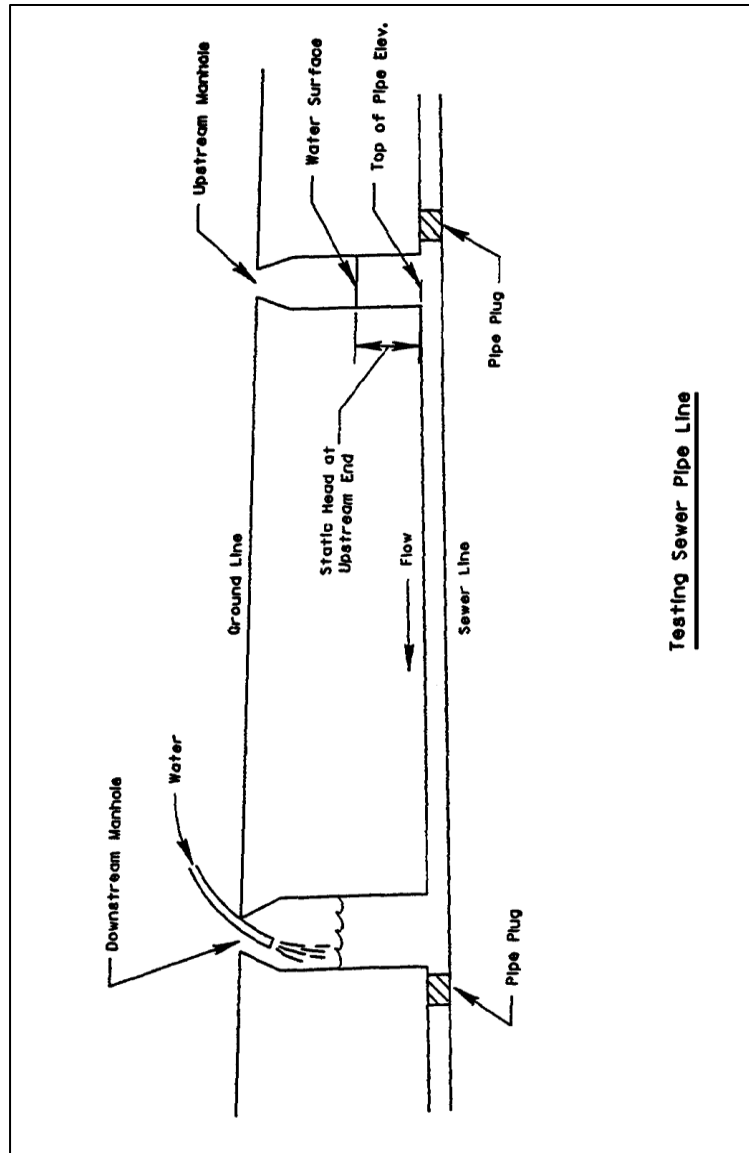
During placement operations, the inspector must spot-check the grade with a level. Good practice is to spot-check the grade points every 20-30 ft or once on pipes of 3-6 ft lengths. The inspector must check all of the grade stakes, verify the entire grade, and check the beginning and ending elevations at manholes, catch basins.

Placement of sewer lines in urban areas requires the utmost control for grade. Storm sewer lines are designed to take care of all surface drainage in the project. A change in grade on curb and gutter will almost invariably cause a similar change in grade on a catch basin or flow line of the sewer. The importance of completely checking all surface grades and line grades cannot be overemphasized.

When the project will not be completed in one season and the catch basins have been installed, but the pavement is not complete, provisions must be made for getting the drainage into the basins. Holes may be left in the wall at the necessary elevation. The holes should not be too low, as this will cause washing and plugging. The holes should be of 4-6 inches in size to avoid plugging.

Testing Sanitary Sewer Line. The sequence of operations in testing a sewer line (as presented in the following illustration) is as follows: using pipe plugs, a section between two manholes (including the manholes) is blocked off so that water may flow in the pipe between the two manholes but not enter the line before the first manhole or after the second manhole. The inspector must be present during filling of the test section to check that water can flow from one manhole to the next manhole. The head measurement is made in the upstream manhole. The measurements of the water depth in the manhole allow water volume loss to be determined from manhole dimensions. Both manholes' water levels will drop and the two volumes of water must be added together.

An alternate method for testing sanitary sewer lines has been added to the specification. This low-pressure air method must have special attention to assure that a good, firm plugging system is used. A 12-inch diameter plug will produce 450 pounds of force and increases by the square of the radius of pipe being used. Safety precautions must be taken due to the high safety risks that are involved with this method.



Documentation for Pay Quantities. Documentation for Sewer Lines is similar to Culverts per CA [Section 602](#).

Manholes, catch basins, and inlets must be computed and reported to the nearest whole unit. Sewer pipe must be measured and reported to the nearest foot.

Reports. Report compaction of backfill on the [ITD-0850 form](#), Nuclear Density and Compaction Report for Soil and Aggregate.

606.00 Pipe Underdrains and Urban and Rural Edge Drains.

General. General installation conditions are the same as for culverts. Perforated pipe is used for under drains and should be placed with the perforations down. The placement helps prevent infiltration of silt, gravel, or other solids that might clog the line and destroy the effectiveness of the system. Placing the perforations down also lowers the water table.

Special backfill should be used to provide a free draining material to carry the water from the aquifer to the pipe. Care must be taken to assure that this flow is not interrupted by the introduction of a stratum of impervious material, such as topsoil. Materials used for special backfill should be sound and not degrade under water conditions or compactive effort.

Backfill material should be graded to meet adjacent soil size and pipe perforations. Use of filter fabric is encouraged to prevent soil migration and pipe clogging. In the case of metal pipe, be sure the proper thickness (gauge) is installed.

Documentation for Pay Quantity. Documentation for Pipe Underdrains is similar to Culverts per CA [Section 602](#).

Reports. Compaction of backfill and special backfill, when required, must be reported on [ITD-0850 form](#), Nuclear Density and Compaction Report for Soil and Aggregate.

607.00 Embankment Protectors.

General. A problem is often encountered when compacting the material around spill pipes and embankment protectors. These installations are highly susceptible to washouts at the inlets. Pipe washouts are usually due to inadequate sealing around the inlet structures. A dense, fine material should be used for the bedding and backfill of the area around the inlet. The soil should be free of organic material and provide a seal against water penetration to reduce the possibility of a washout. The entire bedding and backfill material of a spill pipe or embankment protector should be a dense material whenever possible. A common error in constructing the area around the inlet is not providing adequate slope for the drainage to enter the pipe. In many cases, especially on relatively steep grades, the drainage runs past the inlet area. In the case of metal pipes, be sure the proper pipe thickness (gauge) is installed per CA [Section 601](#).

Documentation for Pay Quantity. The diary will be used to verify the activity, date, and work location. Quantities and final measurements will also be documented by diary entry. If the project has a large number of these items, a summary sheet may be helpful. Embankment protectors must be computed and reported to the nearest whole unit. Discharge pipe shall be measured and reported to the nearest foot.

Reports. None.

608.00 Aprons for Pipe.

Inspection. Aprons should be inspected in the field and rejection due to damage or manufacturer's defect is the responsibility of the field inspector. The inspector must keep in mind that as material is delivered to the project, it will be handled many times and may become damaged. Thoroughly inspect each apron, making sure that it is the type called for on the plans and that no defects exist. Concrete aprons should be checked for roundness and cracking from transit. Rubber gaskets used with concrete must be examined to ensure that the gaskets are of the proper size and quality.

Do not overlook the inspection of the caulking, gasket, and gasket lubricant, if applicable, for conformance to specifications.

Care must be taken during installation that the placement of the apron lines up correctly with the direction of the flow to ensure that the flow will not bypass or undermine the apron. This is especially critical on skewed installations. Riprap should be applied if necessary to prevent erosion around and under the inlets/outlets.

It is also critical that the mounting base and backfill material be at the proper elevation and compacted properly.

Documentation for Pay Quantity. On projects containing a large number of aprons, the Engineer should maintain a check sheet for all aprons on the project. The location and size can be entered with a subsequent entry showing the final quantities. The procedure simplifies the total inventory of aprons and will preclude any duplication of payment.

When the culvert ends in an apron, headwall, or minor structure, the back of the headwall will be the outer limit for payment of structure excavation and compacting backfill on the culvert. Structure excavation and compacting backfill work related to the apron installation is considered incidental.

Aprons will be paid for by the each unless otherwise indicated.

The diary will be used to verify the activity, date, and work location. Quantities and final measurements will also be documented by diary entry. Reports. None.

609.00 Minor Structures.

General. The same quality of workmanship is required for minor structures as any other structure. The cost of minor structures is extremely high as compared to other work on structures.

The adjacent landowner should be contacted, if possible, to assure that the planned minor structures will fit the need and operation of the landowner after the construction of the project. The direction or method of irrigation may change after the initial design.

Right-of-way agreements must be checked to assure their requirements coincide with the plans. Supplemental agreements may be necessary to effect changes that can be advantageous to the owner and the Department.

Staking. This work is usually performed by the contract surveyor. In the rare case that Department (or Owner's representative) personnel perform this work, use the following guidance. Minor structures will be constructed in conjunction with drainage facilities. Plans on minor structures should be checked for discrepancies. There are frequent omissions with respect to the number of ditches connecting a structure and errors in flow direction. The elevation of the flow line of the ditch with respect to the flow line of the pipe often varies from that presented in design. Elevations of the tops of minor structures require careful attention and may require a vertical extension of the structure walls. The top of an irrigation structure should be at least 4 inches higher than the ditch banks. Correct elevations are essential so that minor structures serve the intended purpose.

The surveyor should be familiar with the entire drainage system before the original staking of minor structures. A minor structure should not be staked as an isolated part of the system. Verify and match all elevations to obtain a continuous uniform flow from one right-of-way to another. Situations may change between the time the designer first conceived what should be constructed and the time of actual construction. The surveyor may be the only one able to discover needed changes.

Inspection. Follow concrete construction requirements for minor structures. The inspector should check all forms prior to placing concrete for correct dimensions and steel reinforcement. Check the location of keyways, bolts, and other special items that must be in place before pouring the structure. A check should be made from a distance to see that the portions of the structure are in the correct place and proper position. Do not assume that the survey crew has correctly interpreted the design. Ensure the wingwalls fit the ditches. Ensure the landowner can regulate the flow if more than one ditch begins at the structure. Consider the appearance of these minor structures from the roadway.

Documentation for Pay Quantity. The quantities representing the minor structure should be verified by quantity computations. If the original computation matches the plan quantity within 0.1 cubic yard for concrete and 5 pounds for metal reinforcement, no additional check is required. On projects where there are a large number of minor structures, a complete structure listing by location and station is advisable, as it may become difficult to determine which structures have been built and paid for. The list should be kept in conjunction with a pipe summary.

Verification of the quantities by computations is the only documentation necessary for ledger entries. Estimated quantities may be used prior to final computations. However, there should be few occasions when this is necessary. Concrete must be computed to the nearest 0.01 cubic yard and paid to the nearest 0.1 cubic yard. Metal reinforcement must be computed to the nearest pound and timber to the nearest 0.01 MFBM.

Reports. Report compaction of backfill on the [ITD-0850 form](#), Nuclear Density and Compaction Report for Soil and Aggregate.

610.00 Fences.

General. Temporary fences may be required to restrict livestock or protect the work. All temporary fences are the responsibility of the Contractor unless otherwise called out in the contract. SSHC subsections [107.08](#), [107.11](#), and [107.19](#) should be cited for enforcement.

Any changes in the location or number of approaches, driveways, or gates must conform to the requirements of the access control established for the project and will require the Chief Engineer's approval if either the location, width, allowed use, or number of approaches or driveways does not meet with the requirements of Administrative Policy A-12-01.

The addition or deletion of pipe, fences, ditches, minor structures, or the like shall be covered by a supplemental right-of-way agreement. Approaches shall be constructed in accordance with the plans and the current version of *Access Management Standards and Procedures for Highway Right-of-Way Encroachments* maintained by the Department's Right-of-Way Section.

Staking. Particular attention should be given to the staking and establishment of the fence lines. An offset line within the right-of-way may be desirable. A good offset line, 5 to 10 feet from the right of way line, becomes an excellent reference for other features on the project. Extreme care must be exercised in staking fence around interchanges to ensure the right-of-way lines close accurately in these areas. Sometimes the fence stakes may need to be denoted with a color-coded lath to aid the Contractor in keeping other staked features on the project separate from the fence. Reference Administrative Policy A-05-19 for location of the fence with respect to the R/W line.

Inspection. The inspector should first determine that all materials on the project meet specifications. Fence is accepted on a pass/fail basis. Should the Contractor desire to install fencing material before test results are available for acceptance of the materials, the inspector should inform Contractor that replacement of unacceptable material will be the Contractor's responsibility. The inspector must be able to identify and locate all different lots of materials so any unacceptable materials can be removed.

Obstructions and vegetation must be cleared from the fence line prior to construction and in conformance to the specifications. The inspector must be satisfied that the fence is properly staked. The inspector must exercise judgment to determine the correct wire tension. Area climate and temperature at the time of installation will determine the amount of tension.

The inspector should also be aware of the location of utilities, headwalls, and pipe structures that may interfere with the proper alignment of the fence. An on-the-spot review prior to installation will avoid unnecessary conflicts.

The Contractor should be cautioned that equipment and work must be confined to within the right-of-way or construction easement. A fence Contractor that trespasses outside of the right-of-way or construction easement, without the property owner's consent, may strain public relations and could result in legal action.

Documentation for Pay Quantities. Enter final fence quantities in the ledger only after final measurement has been made. Daily estimates may be used for progress estimate payments. The diary will be used to verify the activity, date, and work location. Quantities and final measurements will also be documented by diary entry. A summary sheet may be used for the braces and gates. Braces and gates will be computed and reported by the unit. Fence shall be measured and reported to the nearest foot.

Reports. None.

611.00 Cattle Guards.

Inspection. Thoroughly inspect all materials to ensure they are the type called for on the plans and that no defects exist.

During installation, ensure that the placement of the guard matches the existing roadway slope or crown and that the appropriate pit slope exists for drainage.

It is also critical that the bearing pad materials be at the proper elevation and bonded properly or secured as specified.

All exposed metal surfaces must be painted as called for and all hardware fasteners must be galvanized.

Documentation for Pay Quantity. Structure excavation and compacting backfill work related to the cattle guard installation is considered incidental unless otherwise indicated.

Cattle guards will be paid for by the each unless otherwise indicated.

The diary will be used to verify the activity, date, and work location. Quantities and final measurements will also be documented by diary entry. Reports. None.

612.00 Guardrail.

General. Since the designer does not have the opportunity to view the completed roadway for detailed guardrail design, the Engineer should inspect the roadway for guardrail requirements and revisions as soon as cut and fill sections are completed in the grading operation. In many sections, the rail may have to be extended to reduce a hazard. Immediately after this roadway inspection, the Engineer should develop a corrected guardrail order list so that the Contractor may obtain the correct number of posts and lengths of guardrail. At the preconstruction conference, the Contractor should be advised of the possibility of guardrail changes.

The appearance of guardrail is critical under the aspects of highway beautification. Elevation of the tops of posts shall be uniform, giving a smooth transition into curves and slopes. The posts must be well tamped to assure vertical alignment as well as safety. Do not violate design standards when changes are made in the field. Lengthening a run will usually not violate a standard. Shortening of a run of guardrail beyond that needed for embedment, interchanging of terminal types, modifying post lengths, or connections may violate a design standard and should be checked by the Resident Engineer before implementing. A design exception may be necessary.

Note during installation that end terminals (both interim and permanent) which are left exposed to traffic where the speed limit is higher than 35 MPH and that could spear, vault, or roll a vehicle are not in compliance with NCHRP-350 or the AASHTO Manual for Assessing Safety Hardware (MASH), and need to be protected or replaced as applicable.

Documentation for Pay Quantity. The diary will be used to verify the activity, date, and work location. Quantities and final measurements will also be documented by diary entry. Terminal sections shall be computed and reported to the nearest whole unit. Guardrail will be measured and reported to the nearest foot. The pay quantity for guardrail should conform to the ordered amounts and all ordered amounts must have proper certifications for the quantities involved.

Reports. None.

614.00 Sidewalks, Driveways, and Curb Ramps.

614.01 Sidewalks

General. Sidewalk appearance is important with respect to highway beautification. Uniform color and edge alignments are two important appearance factors. Long-term appearance depends upon prevention of cracks, surface spalling, and differential settlement.

Subgrade compaction must be carried out according to specifications. Occasionally water conditions or soft soil conditions may require a course of aggregate base to be placed under the sidewalk.

Sloping sidewalks may require a nonskid surface (e.g., transverse brooming) in order to reduce slipping hazards.

It is important to construct the Americans with Disabilities Act (ADA) compliant features properly. Project designers are required to provide a plan set that meets ADA requirements. However, it is not unexpected that conflicts may arise during construction. Resident Engineers and construction inspectors should be familiar with ADA requirements and the [Standard Drawings](#) that show properly designed features, and they should use extra caution to construct an ADA compliant and useable facility. They should field verify the design for ADA compliancy before construction begins.

Small adjustments of features may need to be made in the field to meet these requirements. The designer should be consulted whenever minor adjustments are made to the plans to ensure that additional problems are not created or the functionality of the design is not compromised. Whenever major conflicts are identified, the designer must be consulted to provide necessary redesign, and a change order issued.

Documentation for Pay Quantities. The diary will be used to verify the activity, date, and work location. Quantities and final measurements will also be documented by diary entry. Calculation sheets or field notes may also be used to report final quantities. Quantities will be calculated to the nearest 0.1 square yard and rounded to the nearest square yard on the estimates.

Reports. Report compaction tests on the [ITD-0850](#) form, Nuclear Density and Compaction Report for Soil and Aggregate.

614.02 Driveways

General. Driveways and approaches are normally constructed to stop at the right of way line with the intent to provide serviceable access and protect the road edge. Radii and grade should be staked. Care should be taken so that the width and stationing is staked according to plan with a smooth elevation transition to the existing driveway or access road surface.

All changes to an approach or driveway either in width, location, or allowed use must be addressed on the [ITD-0606](#) form prior to construction. Alternatively, changes may be documented during project closeout by having District Right-of-Way record the changes in the appropriate documents and be

handled in accordance with Administrative Policy A-12-01 in the current version of the Access Management Standards and Procedures for Highway Right-of-Way Encroachments manual.

Questions should be directed to the District Traffic or Right-of-Way sections or their headquarters counterparts. All changes that do not meet the requirements of Administrative Policy A-12-01 must have the Chief Engineer's approval. Additionally, FHWA must give approval for any changes involving Interstate access. The Construction/Materials or Design/Traffic Sections can facilitate this coordination.

If an approach or driveway is moved and if costs change, a change order will be prepared. **All changes must be noted on the as constructed plans.**

Documentation for Pay Quantities. The diary will be used to verify the activity, date, and work location. Quantities and final measurements will also be documented by diary entry. See:

- Surface Courses & Pavement – CA [Section 400](#)
- Concrete – CA [Section 502](#).

Urban approaches will be computed and reported to the nearest whole unit.

Reports. Report compaction tests on the [ITD-0850](#) form, Nuclear Density and Compaction Report for Soil and Aggregate.

614.03 Curb and Gutter

General. Along with sidewalks, the curb and gutter comprise the finishing touches of a road or street. The alignments, finish, matching with old curb, and grade are important factors in the appearance of the final result.

Staking. The spacing of grade and alignment stakes will vary from 10 to 25 feet depending upon field and design conditions, such as vertical curves and radii. Since 10 foot-long form sections are often used, a staking interval of 10 feet is good practice. Grade stakes for the aggregate base course should not be placed so that the rolled plant mix is ever below the lip of the gutter. This will prevent the roller from overloading the lip of the gutter.

Inspection. Curb curing must be performed according to the specifications. If curing compound is used, it must be sprayed on immediately after the finishing is completed.

In construction of extruded curbs, there may be a tendency of the machine to climb when placing around a sharp radius and matching to an existing curb. The machine operator must adjust to this situation.

Documentation for Pay Quantities. Diary entries must be made for estimated and final quantities. If a pay item is an estimated amount, clearly mark this as an estimated item. The diary will also be used to verify the activity, date, and work location. Curb and gutter will be measured and reported to the nearest foot.

Reports. None.616.00 Signs and Sign Supports.

General. As soon as grading operations permit accurate determination of sign placement and signpost lengths, a list of sign post lengths will be developed by the Contractor for approval by the Engineer in accordance with SSHC [Subsection 106.02](#). The list must be developed at an early date, especially where steel signposts are involved, as fabrication may require a considerable amount of time. If the placement of a sign or signs at the location shown on the plans is impractical, the District Traffic Engineer should be contacted to determine a new location.

Foundations. Concrete sign foundations for breakaway steel posts must be set at proper elevations with respect to the finished ground line. A foundation that is located too high becomes a roadside hazard rather than an integral part of a safety feature. A foundation that is too low can also create a roadside obstacle due to impairment of the intended breakaway action by soil or aggregate in the breakaway plane.

Breakaway Post Fabrication and Erection. Inspection of breakaway H beam posts should verify that fuse plates have been installed after galvanizing. If the signposts are delivered preassembled, torque of the fuse plate bolts should be checked on sufficient posts to verify the proper fuse plate bolt tension.

For three and four bolt slip bases, proper breakaway of type A and B signposts is contingent on having the correct torque on the slip base bolts. Over tensioning of these bolts may reduce the effectiveness of the breakaway design and can even cause failure of the anchor bolts on vehicular impact. The slip base bolt torque must be carefully checked.

Break-Safe systems do not require a specific torque. Follow the manufacturer's recommendations for the hinge plate (fuse plates) couplers and bolts for tightening requirements. Break-Safe slip bases are addressed in the [Standard Drawings](#).

Anchor Bolt Repair. Units with three and four bolt slip bases must have their high-strength anchor bolts protected prior to erection of the signposts to avoid having them bent or broken by construction traffic. Repair of broken or bent anchor bolts is quite expensive and welding is not an acceptable method of repair. Broken or badly bent high-strength anchor bolts must be repaired by total foundation replacement or by using high-strength sleeve nuts.

This second method of repair requires that a portion of the foundation be removed to a point that will permit the installation of the sleeve nut to be entirely embedded in the replaced concrete. The sleeve nut and bolt extension must be adequate in size to develop the strength equivalent to the original design. The sleeve nut and bolt extension must be cadmium plated.

Straightening of badly bent high-strength anchor bolts should not be allowed, as these bolts are extremely brittle. Although they may appear okay after straightening, they are fractured and may later fail under very light loading conditions.

Working Drawings (Shop Drawings). Working drawings for sign structures and signal supports are to be submitted by the Contractor for approval as indicated in SSHC [Subsection 105.02](#) and as modified by SSHC [Subsection 616.03](#). Final shop drawing submittals for these structures must meet all Subsection 105.02 requirements and must be transmitted to the Traffic Engineer for storage.

The submittal shall also include CADD drawings in the acceptable format.

Documentation for Pay Quantity. The diary will be used to verify the activity, date, and work location. Quantities and final measurements will also be documented by diary entry.

Reports. None.

617.00 Delineator and Milepost Assemblies.

General. Delineators and mileposts must be installed at the stations and offsets indicated in the plans.

The [Traffic Manual](#) and [Standard Drawings](#) should be consulted to verify proper type, use and installation.

Documentation for Pay Quantity. The diary will be used to verify the activity, date, and work location. Quantities and final measurements will also be documented by diary entry.

Reports. None.

618.00 Marker Posts, Witness Posts, and Street Monuments.

General. The [Traffic Manual](#) and [Standard Drawings](#) cover the subject of marker posts, witness posts, and street monuments.

Marker posts, witness posts, and street monuments must be installed at the stations and offsets indicated in the plans.

Documentation for Pay Quantity. The diary will be used to verify the activity, date, and work location. Quantities will also be documented by diary entry.

Reports. None.

619.00 Illumination.

General. This work, as well as other electrical work and signalization, requires the services of a licensed electrical contractor. Few inspectors have had sufficient experience to thoroughly and adequately inspect this type of work. To overcome this problem, it is recommended that the District Signal Electrician work closely with project personnel to assure plan and specification compliance.

Experience has proven that many potential problems can be averted or minimized by a pre-operational meeting involving the electrical contractor or subcontractor, project personnel, and the Signal Shop Superintendent or District Signal Electrician. This special pre-operational meeting should be held immediately prior to starting the electrical work. It is especially important that the Contractor's job Superintendent or Foreman attend this meeting. The conduct of the meeting should be informal and cover the real critical problems that may be expected or that have occurred on previous projects.

Common Construction Errors. Over the years, a number of recurring construction errors have been discovered regarding electrical work either at final inspections or later when maintenance work was being performed. A list of these more common errors follows. This list is included as a reminder for inspection personnel and should not substitute for the above recommended pre-operational meeting where this list should be presented and discussed with the Contractor.

A. Conduit Installations

1. Use of plastic for elbows greater than 45 degrees instead of steel, as required, causing conduit to be cut when wire is pulled.
2. Steel elbows require bonding when used with Rigid Plastic Conduit.
3. Minor bends in conduit without proper use of bending tools causing partial collapse of conduits and resultant problems pulling wire through conduit.
4. Use of rocky material for conduit backfill instead of fine soil or sand which results in eventual collapse of conduits.
5. Failure to clean dirt and moisture from conduits prior to pulling wire.
6. Failure to cap stub ends and free ends of conduits resulting in intrusion of soil and moisture.
7. Conduit buried at less than required 24 inch depth causing future maintenance problems, such as inadvertent cutting or mashing of conduits.
8. Placement of conduits by other than a qualified, licensed, electrical Contractor. This can result in rejection by the State Electrical Board.
9. Placement of conduits at locations other than shown on the plans without proper indication on the as-constructed plans.

B. Foundations

1. Improper or wrong size anchor bolts installed or installed out of alignment for proper pole base plate fit.
2. Foundation not set at proper elevation. Too high or too low an elevation to permit proper action or exposure of the slip base or breakaway coupler.
3. Improper backfilling or lack of mechanical tamping around foundation may result in eventual tipping of the foundation and pole.
4. Failure to grout under the base of the pole on anchor base installations. **Note:** Breakaway steel neck couplers are **not** to be grouted.
5. Failure to ensure skirts are installed on breakaway coupler installations.
6. Improper placement of structural concrete per SSHC [Subsection 502.03](#) (exceeding max 5-foot drop)

C. Pole Erection

1. Failure to accurately plumb poles after all hardware is in place.

D. Expansion Fittings

1. Failure to install a proper conduit expansion unit at structure expansion joints.
2. Failure to provide expansion couplings on long runs of plastic conduit may result in buckling of the conduit.

E. Wiring

1. Failure to use a wire lubricant prior to pulling through the conduit may damage the wire, its insulation, or the conduit.
2. Use of extreme force and speed to pull wire may damage the wire, its insulation, or the conduit.
3. Unauthorized splices in buried or concealed junction boxes that create future maintenance problems.
4. Failure to use insulated bushings at conduit entrances to metal junction boxes, and cabinets. will scuff insulation from the wire when it is pulled.
5. Use of wrong type or size of wire or wire with improper insulation.
6. Failure to use specified wire connectors or wiring methods, approved for the application per the NEC.

F. Grounding

1. Failure to connect poles, junction boxes, and other equipment to the service ground by an insulated AWG 8 soft-drawn stranded copper wire.

14-Day Field Test. It is the intent of this specification to provide two weeks of standard operation with photocell, manual, or other specified turn-on control. During this test, the Contractor will be responsible for all corrective work resulting from improper installation, workmanship, or materials. Following successful completion of the test, the Engineer should recommend partial acceptance covering illumination. The cost of power consumed during the test period should be borne by the agency or agencies assigned maintenance responsibility by the cooperative project agreement.

Documentation for Pay Quantities. The diary will be used to verify the activity, date, and work location. Quantities and final measurements will also be documented by diary entry.

Reports. None.

620.00 Planting.

General. Landscaping, wetland mitigation, and native and wildflower plantings are several areas where construction personnel may become involved with planting vegetation. With an increasing emphasis on the environment, including promoting and preserving biodiversity and enhancing natural beauty and aesthetics, the Department must take positive measures to preserve and restore natural landscapes that have been disturbed by development whenever possible and to achieve desirable results.

Landscaping and Wetlands. The Senior Environmental Planner in the District must have landscape and planting experience, be familiar with the recommended practices and procedures for planting trees and shrubs and provide guidance early in the project and at the time of planting. Projects with landscaping and/or wetland mitigation typically contain contract specifications with a minimum plant establishment period.

Trees and shrubs come in various forms (e.g., containerized, balled, bare root, and cuttings). The various types of plants require special attention in handling and planting. Plants shall be inspected prior to purchase to ensure plants are robust and in healthy condition before planting.

Prior to planting, a thorough examination should be performed by the Contractor on all plants to ensure they meet compliance and design specifications. The root system of bare-root plants shall be examined and any broken or damaged roots shall be cut off cleanly.

After the original planting, appropriate District personnel shall periodically inspect the condition of plants and planting areas to ensure successful planting and plant establishment. The Engineer will inspect the plants periodically and notify all responsible parties of apparent defects, faults, conditions, and dead plants discovered by the inspection. Correction of apparent defects, faults, conditions, and the removal and disposal of dead plants must be completed within 10 days after notification. Dead or damaged plants will be replaced at the earliest suitable time. Plant replacement will not be postponed until the end of the establishment period.

If immediate replacement of dead or rejected plants is impossible due to seasonal conditions or because specified plants are unavailable, a marker should be placed at the spot of replacement (if necessary) and replacement will be made during the next planting season.

Native Plants and Wild Flowers. A landscaping project involves any action taken as part of a highway construction project or as a separate action to enhance the aesthetics of a highway through placement of plant material consistent with a landscape design. States are encouraged to use native plants on highway projects as part of erosion control measures, wetland mitigation or restoration, and/or as a total vegetation management program. All work performed in association with landscaping will be included in the total landscaping expense. This applies to all projects with a landscape, seeding, and/or planting design plan.

Guidance information has been included in Appendix E.30.04 of the [Roadway Design Manual](#) and provisions for native plants or wildflowers shall be incorporated into each landscape project (including roadside seeding and plantings) unless a waiver has been signed.

Documentation for Pay Quantities. The diary will be used to verify the activity, date, and work location. Quantities and final measurements will also be documented by diary entry.

Reports. Construction Inspection Reports: [ITD-1406](#) and [ITD-2802](#) may be used as needed.

621.00 Seeding.

Seed Supply and Ordering. Seed supplied by the Department should be available at the Supply Services Warehouse. Order seed using an updated and unnumbered [ITD-2379](#) form. The most recent version of the order form must be prepared and routed to the District Supply Operations Supervisor or appropriate source, prior to submitting the unnumbered form to the Roadside Program Manager for final entry and approval. The following is a set of guidelines to use when preparing an order.

- Use one ITD-2379 blank form for ordering seed. Do not include any other items except seed on this form. Use a separate ITD-2379 for each project.
- On the ITD-2379, fill in work authorization number (project code), function (or task) expenditure type, and organization code, description of seed species, unit of measure (in pounds), and quantity needed. These codes change periodically and should be filled in by the Roadside Program Manager). Use appropriate rule codes for all projects on State or local systems. Provide project name and number, including key number, and a short description or project location under the comments field.
- Calculate the pounds for each kind of seed species (e.g., grass, forbs, and shrubs) needed and add 10% to the amount. Round quantities for each grass seed species to multiples of 50 lb, legume seed species to multiples of 10 lb, and shrub or forb seed species to multiples of 5 lb. Record these quantities on the ITD-2379 form.
- If native seed is desired or specified, contact the Roadside Program Manager for assistance in species selection and quantities. Record pounds for each native seed species requested on the ITD-2379 form following the legume species list. Quantities of native seed species shall be calculated in multiples of 5 lb in most instances.
- Use correct name and identifier symbols or codes, as shown in the [Idaho Roadside Revegetation Handbook](#) in conjunction with the [Roadway Design Manual](#) and seed supply listing obtained from Supply Services Warehouse. **Do not insert ITD catalog numbers.**
- Give your best estimate as to what date need the seed delivered. Order seed a minimum of 30 days in advance of desired delivery date to ensure order is received in a timely manner. It is best to allow more time if possible, but do not order seed more than 3 months in advance.
- After completing the information on the unnumbered ITD-2379 form, except for Activity Code and Supply Catalog numbers, route the ITD-2379 to the District Supply Operations Supervisor. The District Supply Operations Supervisor will send the order to the Roadside Program Manager for approval and retain a copy for District Supply files. The Roadside Program Manager will assign a K document number on the ITD-2379 form and send it to Supply Services for data entry. The Roadside Program Manager will return copies of the ITD-2379 to the District Supply Operations Supervisor and Resident Engineer after approving the form.
- Return all unused seed appropriately labeled and in original unopened bags to District Supply. A credit will be made to the original purchase code charging the project and the District Supply General Inventory Account will be debited. Do not return any containers or bags of mixed seed or any open bags containing unmixed seed. All mixed seed left over or seed left in opened bags or containers will be transported to the District Maintenance Section and documented on an

[ITD-0500](#), Inter-department Correspondence form. Document the quantities transferred to Maintenance on the ITD-0500.

Seedbed Preparation. Seedbed preparation includes weed control and soil conditioning, which are vital for successful seed sowing and long-term plant establishment. Areas to be seeded must be maintained reasonably free of weeds by mechanical means or application of appropriate chemicals until seeding time. All weeds must be kept from going to seed.

Slopes that are 2H:1V or steeper are best addressed by hydro-seeding or broadcast seeding. Areas to be broadcast seeded must be roughened and cultivated immediately prior to seeding at a minimum depth of 2 inches, and must be left in a rough condition similar to that obtained by walking a crawler tractor up and down the slopes in a perpendicular direction to slope contours. Where slopes are benched or serrated, no additional preparation will be required. Reference the ITD [Best Management Practices Manual](#) as needed.

Frequently, cut slopes are too hard and too smooth to obtain adequate seed coverage from the sloughing of the soil. Cut or excavated slopes steeper than 2H:1V may be constructed with stair-step or serrated conformation (e.g., terraces or benches) to encourage vegetative growth and establishment. The steps or serrations must have approximately 1-2 feet vertical dimension with horizontal dimensions to fit the slope. Steps or serrations must follow approximate contour lines and not be constructed on slopes containing soil types that are sandy, rocky, non-cohesive or highly erodible, or in soft rock laminations.

Slopes that are 3H:1V or flatter and areas without excessive rock, gravel, or hardpan soil are best addressed by drill seeding. Soil must be roughened using normal tilling methods and must be cultivated to a minimum depth of 3 inches. The soil must be worked to obtain a desirable surface that will permit proper operation of drill seeding equipment. When using ripper teeth or scarifiers, serration intervals must be set to 3 feet spacing width and 12 inches deep. Unless otherwise specified, seed, fertilizer, and mulch must be applied in separate operations, one following the other in this order, except fertilizer may be applied with a fertilizer attachment at time of seeding or with water when watering is specified. Tillage and drilling must be performed cross-slope (horizontal) and furrows shall remain open.

Constructed or excavated slopes 3H:1V or flatter that includes topsoil application must be roughened, serrated and/or cross-ripped horizontally to the slope, prior to placement of the topsoil. After topsoil has been spread, the surface must be prepared for seeding as specified above.

On areas subject to severe erosion, the extent of seedbed preparation must not exceed the area on which the entire seeding and mulching can be applied within a one-day operation. If conditions occur that prevent seeding in appropriate furrows (i.e. depth according to size and dimension of seeds), or if the roughened condition is destroyed, the Contractor must prepare the seedbed again.

Weed control is part of the seedbed preparation to keep weeds from going to seed and to reduce weed growth and spread from interfering with seeding operations. Weed control must commence after weed seeds have germinated and plant growth is noticeable. Immediate action must be taken on existing weeds to control and prevent additional weed seed production. Method of control, appropriate application, and timing are essential for best results. One treatment may be sufficient if these

conditions are met. To determine the most appropriate or best method of control, mechanical or chemical application, contact the District Vegetation Foreman or the Roadside Program Manager for assistance.

Weed control is best achieved when applied after the last early season rain and before weeds reach blooming stage. This normally occurs between May and July depending on the region or area.

Weed control is the responsibility of the Contractor and is not considered an extra expense. The method of weed control will require prior approval from the Engineer. If additional weed control is necessary due to Contractor error and/or failure to appropriately seed the areas during the specified seeding season (as required in SSHC [Section 621](#)) the costs of additional weed control are the responsibility of the Contractor.

Broadcast Seeding. Areas to be seeded that are not practical for drill seeding methods may be broadcast using hydro-seeder or dry broadcasting equipment. It was found that some broadcast seeding methods that combined wood fiber, seed, and fertilizer into one broadcast operation resulted in higher failure rates. The fiber seems to attach tightly to the soil particles and provides a barrier to prevent temperature and moisture penetration. There is greater moisture lost under the fibers than in areas where the seedbed was properly prepared without mulch. In areas where wood fiber and seed were mixed together, most of the seed was found suspended in the fibers above the soil where germination is impossible without high moisture conditions. When fertilizer was included in the mix, a greater number of seeds were found burned in the mix. Therefore, seed, mulch, and/or fertilizer must be applied in separate applications. Seed must be applied to the seeded area first, followed by mulch and/or fertilizer applications second. Agitation of seed in hydro-seeder shall not exceed 30 minutes due to an increase in seed damaged by the hydro-seeder if seed is circulated over 30 minutes.

If certain conditions exist (e.g., soils that are too hard, loose, or smooth) that prevent adequate seed cover or moisture retention near the seed long enough for germination to take place) then alternative actions or methods should be considered and a change order initiated, if applicable.

Broadcast rate includes number of seeds distributed per square-foot of surface area. Generally, broadcast seeding requires more seed per acre than for drill seeding.

Poor sites such as south and west-facing slopes require more seed than favorable sites; and the upper portions of the slopes should receive more seed than the lower areas on the slope. The number of seed required depends on the type of seeding method used. The following is a list of seeding methods ranged in order of low quantity of seed required to high quantity of seed required: drilling, whirlwind broadcast, hydro-broadcast, and aerial broadcast.

Drill Seeding. Proper drill seeding techniques are important in obtaining successful seeding. Most drill seeding failures are results of improper seed placement in the soil (e.g., too deep, too shallow, or low moisture accumulation). Several factors affect seed establishment, including improper seedbed preparation, incorrect disc spring pressure, failure to use appropriate depth gauges, improper drill or drilling speed, or drilling when wind is too strong.

The seedbed must be prepared and soil loosened enough to allow the disc to penetrate the soil and still maintain appropriate depth control. Drill rate must be accurately calibrated for proper row spacing and number of seeds (quantity) distributed per foot of row length. Drill rows must be spaced no wider than 6-7 inches in order to avoid weed competition and stand establishment delays.

Disc spring pressure should maintain appropriate depth control. However, in some cases depth gauges may be necessary to compensate for limited spring adjustments. Fast drill speeds and/or high winds can contribute to seeding failures by leaving seed on the soil surface instead of burying the seed underneath the soil.

A double-disc drill with agitator is required when mulch is not included. The drill must be properly adjusted and operated so that the seed is placed at the bottom of small, cross-slope furrows approximately 2 inches deep, with minimal soil covering. Furrows should be set according to the size and dimension of the seed. Depth of soil covering the seed must not exceed ½ inch and furrows must be left open. Drag chains are not acceptable and must not be used. If the furrows are constructed properly and seed is accurately placed at the bottom of the furrows, the wind and water from the sloughing of the soil should adequately cover the seed.

If mulch is used, the type of mulch and method of application must be specified. Mulch must be an approved product and certified by an authorized agency as noxious weed free. Mulching must not be performed when wind interferes with mulch placement. Straw, grass hay, compost, wood fiber, soil amendments (or mulch mixture), or any combination of these materials must be applied uniformly and as directed. All material applied to the ground must allow for the absorption and percolation of moisture.

When mulch is used, cross-slope furrows should not be too deep and should be mechanically anchored into the soil. Where grain straw or grass hay is to be anchored by mechanical crimping, it must have approximately 50 percent of the stems exceeding 10 inches in length. Furrows must be deep enough to hold the seed in place, with maximum soil coverage of ½ inch, until mechanical anchoring is completed. This will provide additional seed cover. Mechanical mulch anchoring must be completed on slopes 3H:1V or flatter. Mulch must be anchored into the soil by use of a heavy disc with flat scalloped discs approximately ¼ inch thick, having dull edges and spaced no more than 9 inches apart.

Anchoring must be to a depth of at least 2 inches with no more than one pass of the equipment on the same surface. All mechanical anchoring must be done horizontal to the slope.

Seeding must not commence when wind interferes with seed placement as determined by the Engineer. Drill spacing must not exceed 9 inches. Legume seed must be seeded through a separate box from grass seed, with seed spouts out, or broadcast ahead of the drill. Native seeds in the mix must be broadcast immediately ahead of the drill. Seed must be thoroughly mixed before placing in the drill or seeder box.

The goal is to place the seed under enough soil with adequate provisions to hold moisture. Both the furrows and the mulch serve to accumulate moisture. Once the drill is adjusted, monitor the drill speed, wind conditions, and free-flowing spouts. If the drill is not equipped with an agitator and the seed bridges over, correction can be made by properly securing baling wire to the drill box and monitoring seed dispersal.

Areas to be seeded that contain intermittent rocky areas may be broadcast seeded by raising the drill while going over the rocks, allowing the seed to disperse out. When the drill discs are raised high enough to clear the rocks and the seed delivery system remains in gear the seed is able to disperse over the rocks. If this method doesn't work or the drill cannot be raised high enough to clear the rocks, then the seed should be broadcasted by hand or by some other broadcast method. Drilling in or around rocks should be avoided where equipment may be damaged. Do not drive equipment over the area after seed is in place.

Mulch Anchoring. For slopes 2H:1V or steeper, a mulch tackifier should be used to help anchor the mulch. Mulch anchoring (tackifiers) must be a material that bonds mulch together in such a manner that it will prohibit the mulch from washing or blowing away after application. When cured, the tackifier must not be re-emulsifiable. The tackifier must be soluble (mixable) in water and nontoxic to animals, soil microorganisms, aquatic and plant life, and not interfere with or impede seed germination or vegetative growth and establishment. The tackifier must be applied in accordance with the manufacturer's written instructions and applied at a rate that is acceptable to the mulch, soil type, condition and degree of slope.

Mulch plus tackifier must consist of premixed packaged wood fiber mulch with tackifier or wood fiber mulch plus tackifier added prior to application and be mixed in accordance with manufacturer's written instructions.

If applied separately, incorporate a method to differentiate between the tackifier and mulch material by color or tracer material. Do not tack when wind interferes with tackifier placement.

The general rule in achieving good seed germination and growth is to lightly cover seed with enough moist soil for a two-week period when soil temperature is above 50° F. Survival of the seeding, after the seed germinates, depends on selecting the appropriate season for seeding and the correct seed mix.

Soil Amendments. Soil amendments must consist of organic soil-applied compost or manufactured organic soil amendments. Compost must be a Class A compost that meets or exceeds [US EPA 40 CFR #503](#) requirements, SSHC [Section 711](#) for Classification Type I and pass a Solvita Maturity Test of 5 or greater.

Manufactured organic soil amendments and/or biological soil stimulants must consist of organic materials, nutrients, and minerals that show the propensity and performance to facilitate and sustain the germination and growth of vegetation.

Mulch Mixture. Mulch mixture must consist of mulch, soil amendments, biological soil stimulants, soil microorganism inoculants, bonding fibers, tackifiers, and/or other erosion control and plant nutrient ingredients as specified. Mulch mixture must be premixed using the specified products and rate, and shall be hydro applied in one operation.

Erosion Blanket. For slopes 2H:1V or steeper, an erosion blanket may be used to stabilize and protect the soil surface. Erosion blankets must be a material that protects disturbed soils from raindrop impact, surface run-off, and soil erosion. Erosion blankets may consist of either a pre-manufactured roll (e.g., biodegradable or synthetic), or a bonded fiber matrix or liquid mixture sprayed onto the soil surface. The type of blanket must be as specified or approved, and must be installed according to the manufacturer's recommendations or as directed.

The rolled erosion blanket must be placed with fibers in contact with the soil over the entire area covered. The blanket must not be stretched taut. The blanket must be anchored at joints, corners, and along the edges. Blankets on slopes must be installed vertically to the slope. The blanket edge along the top of the slope and the ends of adjoining blankets on the slope must be buried and anchored in an approved manner to prevent slipping or displacement of the blanket. Blankets used in ditches or channels must have a minimum width of 3 ft. Blankets must be anchored and overlapped in an approved manner so water will neither flow under nor displace the blanket. Adjoining blankets must be overlapped in the direction of water flow or as recommended by the manufacturer.

The liquid erosion blanket mixture must be soluble in water and nontoxic to animals, soil microorganisms, aquatic and plant life and not interfere with or impede seed germination or vegetative growth and establishment. The mixture, as well as mixing and applying the mixture, must be in accordance with the manufacturer's written instructions and applied at a rate for the soil type, roughness of surface, conditions and degree of slope.

Fertilizer. Fertilizer type and application must be as specified. Fertilizer may be either broadcast (wet or dry) or drilled. For drill seeding method, it is preferable to place fertilizer with the seed at time of drill seeding by use of a fertilizer attachment whenever physically possible. For broadcast seeding method, it is preferable to apply fertilizer as a separate application after seeding. Fertilizer may be applied as dry ingredients or thoroughly mixed in a liquid mixture. Fertilizer may be applied with irrigation water as directed. When fertilizing established stands, fertilizer must be applied when the average noontime temperatures are 60° F or lower. Fertilizer must be certified by an authorized or approved agency and declared or certified as noxious weed free prior to acceptance.

Watering. A temporary water delivery system must be installed by use of either sprinklers or trucks. Water must be applied by the acre unit at the times directed. A one acre unit constitutes application of 0.5 inch of water over a 1-acre area, which will saturate the soil to a depth of 4 inches under average conditions.

Pipe connections must be kept tight to avoid leakage and washing. Sprinklers must be maintained in proper working order. Should runoff begin, watering must be stopped and the balance applied after earlier water has penetrated the soil. The standard application rate is 16,000 gallons/acre and

constitutes the amount of water which will saturate the soil to a depth of 4 inches under average conditions.

Inspection for 4 inch depth of saturation must be made by excavating to a depth of 4 inches and observing for wetness. It is intended that the wetness inspection locations will be reasonable and not be on slick spots or in unrepresentative areas.

Seeding Season. Selection of appropriate seeding season is essential when developing roadside seeding plans and insuring successful seeding on construction projects. Even though other specifications may be established correctly, if the timing of the seeding is incorrect, then the seedlings will most likely fail. There is constant pressure on ITD to expand the seeding time and seasons when this work can be accomplished but the most suitable time for sowing seeds is usually a three or four week window. This information is very useful and should be followed when planning roadside seeding. The contract special provisions contain required dates for seeding based on average climatic and other conditions for the project location. The specifications allow for some adjustment of these dates as directed. The purpose is to provide a specific time for seeding on a given project so that the season falls within a few days earlier or later of the specified time. Any deviation from the specified dates shall be approved by the Engineer.

Seed Mixtures. The specified seed mixture normally includes selected grasses, legumes, shrubs, and native forbs. Each species is selected because of its unique growth characteristics and/or special needs of the project. There are other definite reasons for using the specified mixtures (e.g., mature height, seedling vigor and longevity, bunch-type grass, size of seed, site suitability, and species ability to integrate or interact with other species during and after establishment). Any deviation from the specified mixes, except for minor substitutions when filling out a seed order from supply, must be approved by the Engineer.

Documentation for Pay Quantity. The diary will be used to verify the activity, date, and work location. Quantities and final measurements will also be documented by diary entry. Payment will be made per the specifications except for authorized additions or deletions, unless otherwise noted. When the unit of measurement is based on plan quantity, SSHC [Subsection 109.01](#) should be reviewed. If the Resident Engineer believes the plans are in error, they should re-measure the area and adjust the pay quantity, if necessary. The Contractor may also request a re-measure; and if the quantities are in error, they should be readjusted.

Reports. None.

622.00 Precast Concrete Headgates.

General. Without high-quality backfilling, the headgate locations are usually the weakest part of the ditch. Care must be taken to provide solid bedding and proper backfill. Material meeting the contract material and compaction requirements and free of any organic matter, must be used for backfilling headgates.

Documentation for Pay Quantity. The diary will be used to verify the activity, date, and work location. Quantities and final measurements will also be documented by diary entry. Right-of-way agreements generally dictate the number and location.

Reports. None.

623.00 Concrete Slope Paving.

General. Concrete slope paving is subject to undermining and concentrated flows of run-off water along its edges, resulting in erosion. Care should be taken during construction to ensure all drainage and run off water is directed in a manner that will protect the slope paving.

Documentation for Pay Quantity. The diary will be used to verify the activity, date, and work location. Quantities and final measurements will also be documented by diary entry..

Reports. None.

624.00 Riprap.

General. Riprap must be placed to the dimensions shown on the plans and typical sections. Refer to the SSHC [Section 624](#) if thickness is not shown on the plans. Slopes and toe trenches that will receive the riprap must be approved prior to placement of the stone. It may be necessary to cross-section or take three-dimensional measurement of the slopes and toe trench prior to placement of riprap to determine whether or not deficiencies exist in thickness or height. Riprap quantities must be computed from the staked dimensions.

Riprap-- Rock taken from the project excavation can be used if it meets specifications and is permitted by the Engineer. This material will be paid for as excavation and riprap. However, this material must be replaced by the Contractor at no expense to the Department or Local Public Agency (LPA) when the excavation is needed for project embankments or other similar requirements. Rock volume swell and borrow volume shrink must be taken into account when computing the replacement quantity.

Make sure that the riprap source is approved. Avoid haphazard dumping which may result in segregation. The finished riprap should be well keyed and present a regular surface having mass stability. Additional guidance may be obtained from the HQ Hydraulics Engineer (or hydraulics engineer of record) or HQ Geotechnical Engineer.

Documentation for Pay Quantities. Riprap and structure excavation must be calculated on a computation sheet or the diary. The diary will be used to verify the activity, date, and work location. Quantities and final measurements will also be documented by diary entry. Quantities shall be computed to 0.1 of a cubic yard, and be rounded off to the nearest cubic yard on the estimate.

Reports. The [ITD-0025](#) Diary can be used to document other riprap quantities.

625.00 Joints.

General. Joints in structures or concrete pavements and the related fillers normally consist of one of the following types:

Construction joints. Construction joints are provided to enable the Contractor to perform the work in reasonably sized increments. When placed in a structure, metal reinforcement or dowel bars normally extend across the joint to tie the sections together. A vertically formed bulkhead must be used to hold the concrete to grade and provide resistance for consolidation. If a construction joint is not shown on the plans, then the Bridge Section (for structures) or the Construction/Materials Section (for pavements) should approve its location. Construction joints placed in concrete pavements may or may not require the placement of reinforcing steel or dowel bars depending on the design or location.

Contraction Joints. Contraction Joints allow for contraction or shrinkage of the concrete. When concrete sets, a small amount of shrinkage occurs and results in a tension stress that causes the concrete to crack. To achieve a more pleasing surface appearance in the finished concrete pavement, contraction joints are placed, tooled, or sawed at predetermined intervals. The theory is that the concrete will then crack in straight lines at the predetermined joints. To keep foreign matter from wedging into the preformed or sawed joints, they may be filled with a sealer or filler. Tooled joints, such as used in sidewalks, are not sealed; but the tooled joint must be of sufficient depth to control cracking. When the depth of a contraction joint is not specified, the general rule is that it should be at least one-third of the depth of the section of concrete.

Expansion Joints. Expansion Joints provide a clear space where the concrete can expand or contract without damaging or distorting adjacent material. Expansion joints allow for the expansion and other movement of bridge decks, curbs, and sidewalks. They are normally filled with a sealer, pre-formed expansion joint filler, or compression seal. The filler or seal must be firmly secured to the face of the joint or the action of the joint opening and closing will eventually work the material out of the joint. Expansion joints sometimes have dowels to tie the joined sections together. The portions of the dowels that are to allow movement must all be parallel and in the same plane. Improperly installed dowels will actually work as ties and prevent movement, rather than allow movement, and result in cracking of the connected sections. It is not important as to which end of a dowel is fastened and which end is free to move. It is good practice to have the fixed end of the dowel in whichever portion of the structure is poured first. This practice will allow minor alignment of the expansion end after the dowel is firmly held by the first pour and, thereby, insures proper positioning.

Expansion joints may also have waterstops installed to prevent water from flowing through the joint. The waterstop should be carefully installed and bonded into both panels being joined. It must be continuous for any particular joint to form a completely waterproof barrier.

Polymer Silicone or Similar Sealers. Polymer silicone or similar sealers rely on their bonding properties to maintain the position in the joint. The joint surface must be clean. Sandblasting is one of the best methods to ensure a clean surface.

Elastic joint fillers. Elastic joint fillers are cellular in cross-section and are of a rubber-like material. The elastic joint fillers normally come in coils or rolls and are inserted into the carefully prepared joint with the aid of a lubricant. Care must be exercised not to overstretch the filler. This joint material works best when kept in a state of compression and for this reason it is best inserted during colder temperatures when the joints tend to be more open.

Documentation for Pay Quantities. The inspector should keep proper records as to lot, joints sealed, surface conditions, and temperature. The cost for these items is included in the contract prices for structure or pavement items. The diary will be used to verify the activity, date, and work location. Quantities and final measurements will also be documented by diary entry.

Reports. None.

626.00 Temporary Traffic Control.

626.01 Devices

General. Use of construction traffic control devices must meet the requirements of the current [Manual on Uniform Traffic Control Devices \(MUTCD\)](#) as adopted by the State.

The Contractor must furnish all construction traffic control devices as shown on the plans, required by the Engineer, and as described in the MUTCD. In addition, all traffic control devices must meet the requirements of [NHCRP 350](#) for crashworthiness so they are not a hazard to the traveling public.

The MUTCD for Streets and Highways, published by the Federal Highway as adopted by the State, establishes the design and application of traffic control devices on all public roads in Idaho. Included in the MUTCD are requirements for traffic control devices to control and guide traffic through or around road and street construction, maintenance operations, and utility work.

Normal design procedure is to establish pay items for certain types of traffic control devices on construction contracts. However, the provisions of the MUTCD and SSHC [Section 626](#) apply to all construction, maintenance, and utility work regardless of the presence or absence of pay items established by the contract.

A contractor's or utility company's operations can change from day to day or even more frequently. Therefore, the Engineer on projects where traffic interference is involved must designate one person to work with the Contractor or utility company daily in coordinating and tailoring traffic control to fit the work in progress. This person should be a trained traffic control technician or supervisor and must be familiar with all the construction traffic control requirements of the [Traffic Manual](#), [Standard Drawings](#), MUTCD and its supplements. The Contractor or utility company should also designate a Traffic Control Supervisor of comparable responsibility with whom the inspector can recommend, propose, and evaluate the solutions to traffic control problems. It is desirable to have the District Traffic Engineer review and approve long term traffic control schemes, detours, or especially critical traffic control problems.

The Construction Inspection Report [ITD-1406](#) form must be used to document conformity of the traffic control provided on the project to the plans, Traffic Manual, Standard Drawings, MUTCD, and any approved modification of the Traffic Control Plan (TCP) at the initiation of the traffic control operation and when changes are implemented. A nighttime review should be included to verify the visibility and adequacy of traffic control devices under the condition of darkness. Subsequent day and night reviews should be made by the Engineer or other qualified staff members periodically and the results documented in the project files using the ITD-1406 form.

Application of Traffic Control. The part of the [MUTCD](#) covering traffic controls for construction and maintenance operations establishes basic principles and prescribes standards for design, application, installation, and maintenance of the various types of traffic control devices. The persons responsible for establishing TCPs must be capable of using good judgment in the selection of applicable devices and using them in accordance with the provisions set forth in the plans, by the MUTCD, or as directed by the Engineer.

A well-designed TCP must satisfy three requirements:

- Sufficient traffic control devices, provided in advance of the work area, to adequately warn motorists
- Adequate visibility and/or protection of the workers and work area.
- Motorists must be safely guided through or around the work area. Consistency in device selection will aid greatly in this effort.

SSHC [Section 626](#) allows for payment for bid items if they are established for several types of traffic control devices (e.g., signs, barricades, drums, tubular markers, vertical panels, advance warning arrow panels, traffic control signal, hazard identification beacons, and pavement striping tape and flexible raised pavement markers). However, this specification does not limit the types of traffic control devices for use on projects to the above items.

Note: Weighted base devices (e.g., barricade warning lights, floodlights or other types of illumination, traffic cones, delineators, and orange flags to supplement important warning signs) must include all weights required to retain the device in its proper position and working order at no extra cost to the Department or Local Public Agency (LPA). Payment for these devices may be provided under Rent Incidental Traffic Control Item.

Although they are not traffic control devices, guardrails (e.g., W beam and concrete rails) have considerable value in some traffic control schemes to protect traffic and work areas.

Condition and Maintenance. Regardless of whether a traffic control device is covered by a pay item or its cost is incidental to other items, only those devices which are in good condition and meet the requirements of the [MUTCD](#) and specifications for color, size, design, intensity, and reflectivity will be used on a project. It is important that once installed on the project, the devices be kept clean, in a good state of repair, and properly located and supported. Properly installed and maintained devices command the respect of motorists and greatly enhance the desired effects. Conversely, improper devices and sloppy maintenance have the opposite influence on motorists. The project should be reviewed to determine if traffic control is to be monitored on a 24-hour basis. If so, it should be clearly specified.

Construction Signs.

Reflectivity. Sheeting on signs used for traffic control is specified to meet retroreflectivity requirements of either Class A or Class B. Class A is enclosed lens retroreflective sheeting and is normally called Engineering grade. Class B is referred to as high performance and is much more reflective than Class A. Class B sheeting can be identified by patterns within the sheeting. Class A sheeting is void of any such pattern. Generally, the sheeting for red and orange signs will be Class B, and the sheeting for white regulatory signs will be specified as Class A. All traffic control devices signs are required to have Class B, Type III, High-Intensity sheeting, and a minimum required retroreflective reading as stated in [ASTM D4956](#). Regulatory Black/White signs are exempted from this requirement. Retroreflectivity readings may exceed minimum requirements, but at no time will they drop below 75percent of the initial reading for Type III, High-Intensity sheeting as stated in ASTM D4956. Questions regarding acceptability of retroreflective sheeting should be referred to the District Traffic Engineer.

Design. The Standard Highway Signs Manual and the MUTCD provide information on the design of the most commonly used construction/maintenance warning signs. Legends other than those shown in the MUTCD may be used provided that the signs are of the same shape and color as standard signs of the same functional types, and have been approved in the TCP. Symbols used on signs must be as provided for by the MUTCD.

All sign sizes, text, sign numbering and design must be as indicated in the ITD Sign chart unless approved by the Department before use. Sign sizes for standard signs are minimum allowable dimensions.

Position, Mounting Height, Location, and Spacing. These requirements are covered in the MUTCD and the [Traffic Manual](#). Some clarification by the Engineer may be necessary regarding the requirements on mounting heights.

The MUTCD establishes basic mounting heights above road surface for primary signs at 5 feet for rural areas and a minimum of 7 feet for urban areas. These standards apply to all primary signs with the exception that temporary signs may be mounted on portable supports a minimum of 1 foot above the road surface unless otherwise shown in the plans or directed by the Engineer. Temporary must shall be considered as **only** those signs which are mounted on temporary supports and used in the workzone for a continuous period of less than three (3) days. Thus, if a sign is needed at a location for a continuous period of three (3) days or more, it must be mounted either 5 or 7 feet above roadway elevation in

accordance with the MUTCD. The lower standard does not apply to Regulatory signs (e.g., speed limit, stop signs).

Signs that are left in place when they no longer apply are as much of a problem as not having a needed sign. They may, in fact, create more resentment by motorists than the latter condition. It is imperative that signs that no longer apply be removed; or if not in use for a period not to exceed two (2) hours, that they be covered or moved to a location at least 15 feet from the edge of the traveled way and laid flat to the ground when not required. The cover should be fabricated from material which is not a vapor barrier.

Covers such as plastic garbage bags can cause damage during warm weather to the plastic reflective sheeting mounted on the sign. Signs and sign supports that are not in use beyond the two (2) hour period must not be allowed to remain on the roadway shoulder.

A. Flagger Signs

It is important that the proper sequence of signs precede the flagger position. The placement of warning signs needs to take into account the length of traffic backup rather than the location of the front of the vehicle queue. Then when the flagger is not required, the signs must be turned, covered, or removed.

Construction Barricades and Drums.

Reflectivity. All barricades and drums must be orange and have white Class B retroreflective sheeting.

Night time inspections should be performed periodically to verify adequate reflectivity of all temporary traffic control devices.

Function, Design, Construction, and Application. These requirements are covered in some detail by the MUTCD. Some items, however, need to be emphasized:

- Diagonal stripes on barricades must slope downward in the direction traffic is intended to pass by the barricade, or in compliance with the MUTCD.
- Drums or barricades should never be placed in the roadway without advance warning signs. Under severe conditions (e.g., heavy traffic volumes, severe curvature) it may be advisable to use flashing beacons on single drums or barricades and steady burning lights on a series for night use. All signs and battery-operated flashing or steady burning lights shall **only** be used on devices that have been crash tested and approved for the same configuration and use.

Traffic Control Signal.

- Traffic control signals must meet all the requirements specified by the [MUTCD](#).
- Requires interconnection or daily time based synchronization to operate properly.

Flashing Beacons. The MUTCD includes several specific requirements on size, mounting, visibility, flash rate, and lamp wattages under Section 4. Do not confuse a flashing beacon, which normally operates on 110 to 120 volts, 60 Hz. A.C., with a battery-powered barricade warning light.

Advance Warning Arrow Panels. The primary application of this device is to assist in the diversion of traffic (e.g., lane closures on multilane highways and total diversion to an interchange ramp).

The specifications require these devices to be capable of 50 percent dimming for night operation. This is necessary to reduce driver disability glare that would otherwise result from the 12 to 15 lamps operating at full lamp voltage during hours of darkness.

Project plans will require the use of advance warning arrow panels for lane closures and diversions on multilane highways where the designers anticipated the need for this device. However, if the job conditions or Contractor operations later dictate lane closures or diversions on rural multilane roadways, a change order should be negotiated to establish the use and agreed price of this device. Very short time diversions and lane closures may not justify the use of advance warning arrow panels.

Temporary Pavement Marking Tape. The ITD [Standard Specifications](#) adequately cover the materials requirements and application. The color of the pavement marking tape shall be in accordance with the color requirements for permanent pavement markings, summarized as follows:

- Yellow separates opposing traffic.
- White delineates the separation of traffic flows in the same direction.
- White is used for pavement marking legends and symbols.

The Resident should request the assistance of the District Traffic Engineer in laying out complex pavement marking schemes.

Temporary pavement markings that no longer apply must be removed immediately.

The specifications require marking of all new asphaltic surfaces (e.g., leveling courses, scrub coats, ATB's, and surfacing courses) on a daily basis. Unless otherwise provided, Department or Owner representative personnel will be responsible for temporary markings on new seal coats and surface treatments. The markings must be applied to seal coats and surface treatments immediately following brooming. Paint may be used in lieu of temporary pavement marking tape if the tape will not adhere to the surface.

No roadway will be opened to traffic until proper pavement markings are in place.

Traffic Control Maintenance. The item Traffic Control Maintenance is provided on projects with traffic control devices. This bid item complements other SSHC [Section 626](#) items and is intended to pay for relocation and maintenance of devices not paid for or rented under other bid items, including incidental traffic control items and costs associated with providing monitoring and surveillance of traffic control devices.

The TCPs and/or special provisions will specify the type of special monitoring and surveillance required if extra attention to these matters is considered necessary due to high traffic volumes or higher speeds.

The Contractor should not be expected to furnish personnel for this activity on a full-time basis unless the plans and specifications explicitly include this requirement.

Regulatory Speed Control Zones. A reduced speed limit should be based on good judgment, experience, and evaluation of geometrics and should not be based merely on the idea that such action will somehow absolve the Department, LPA, or Contractor of any responsibility in case of accidents.

Prior to establishing reduced speed zones through construction projects, some important considerations should be evaluated:

- Is there another feasible and possibly better alternative than reducing the speed limit? Studies have indicated that generally fewer accidents are likely to occur if traffic can be safely accommodated at the prevailing speed limit.
- Based on previous experience, can a reduced speed limit be enforced by a reasonable or normal level of law enforcement?
- If roadway alignment is one of the factors involved in the need to reduce speed, has safe speed been determined by sight distance determinations and by ball bank indicator measurement on horizontal curves?
- Can the reduction in speed be held to a maximum of 10 mph less than the normal posted speed?

Reduced speed zones are often appropriate due to roadway or lane conditions (e.g., constrictions, temporary surfaces, alignment revisions, construction activity interference). Transportation Board Policy 4016 and Administrative Policy A-12-03 give the District Engineer the authority to establish special speed regulations through construction and maintenance zones on the state highway system. This is accomplished by letters signed by the District Engineer and directed to the District Lieutenant of the Idaho State Police and local law enforcement agencies stating the special construction zone speed limit, the location, the date it will become effective, and any special application (e.g., during working hours only). Copies of the letter must be furnished to the Resident Engineer, District Files, District Traffic Engineer, and the Contractor. Speed zone reductions must be removed as soon as they no longer apply.

When the construction speed zone is removed, a follow-up letter from the District Engineer must be sent to the law enforcement agencies informing them of the reversion to the normal speed limit.

Establishment of reduced construction speed zones on locally sponsored projects not on the state highway system requires approval of the appropriate governing body. These procedures must be followed on all projects requiring special speed zones regardless of the origin of the request or requirement. Projects including detailed TCPs that show reduced speed zones must be handled in the same manner as those projects on which speed zone requests originate on the job.

State-Furnished Signs. The specifications indicate that certain guide and regulatory signs will be furnished by the State. This is intended to apply to regulatory and guide signs which are presently installed within the project limits and the construction operations requiring relocation of these signs. However, because some guide signs are difficult to acquire on short notice, the State will also furnish temporary destination signs and route markers.

Traffic Control Plans. It is a Department policy that every highway construction project plan includes a construction TCP. The TCP will vary in complexity and impact on project costs depending on the type of construction and the speed and volume of traffic to be accommodated.

Department policies which mandate TCPs and key elements of those plans are as follows:

A. Administrative Policy A-12-04 Traffic Control during Construction, Maintenance, Utility or Private Development Operations:

Key elements of this policy regarding construction projects are as follows:

1. Public convenience must be considered on every project.
2. The movement of Traffic must be inhibited as little as possible.
3. Maximum delay to traffic should not exceed 10 minutes per stop nor 15 minutes total if more than one delay is necessary to move traffic completely through a project.
4. The construction TCP will provide, if appropriate, limitation of Contractors' operations during periods of peak traffic volumes.
5. Construction contracts must include a comprehensive construction TCP that addresses the safety and efficiency of traffic, pedestrian, and bicycle movement during construction.
6. Any changes to the construction TCP require the approval of the Engineer or their designee before implementation.

B. Roadway Design Manual, Section 300 Preliminary Design, [Subsection 355](#)

These sections of the Roadway Design Manual set forth policy and procedures on TCPs. Among items covered and not discussed elsewhere in this manual are the following important points:

1. TCPs for interstate highway projects should provide for minimum interference with the free flow of traffic.
2. Stopping of interstate traffic must be avoided and only considered in an emergency.

The above described policies cannot be enforced with the Contractor unless they are appropriately adopted by the contract. However, if the designers have neglected including provisions as required by policy or if contract changes are made that may require employment of the described policies, a change order must be prepared to incorporate provision of the applicable policies.

TCP's may be revised at the request of the Department, or LPA, or the Contractor to provide for a better or more efficient plan or to accommodate revised work, or a Contractor proposal to pursue project construction in a manner different than anticipated by the designer. Major revisions in TCPs will be accomplished only after a contract change order allowing the revision is approved. Alternate TCPs will be evaluated for acceptance on the basis of equality of safety and traffic accommodation and cost as compared to the original TCP.

Documentation for Determining Pay Quantities. The diary will be used to verify the location and type of temporary construction traffic control devices placed on the roadway.

Construction operations are not to begin until traffic control devices are approved by the Engineer.

No payment will be made for devices that do not conform to the [MUTCD](#). This includes, but is not limited to, installation height and spacing, reflectivity at night, and sign face condition.

For ease in calculating, it is suggested that the sign chart in the construction TCP list the square foot quantity of each sign. The ledger will summarize the total quantity of the item and reference the diary and charts as the source documents. Quantities must be computed to 0.01 ft², and rounded to the nearest 0.1 ft² on the estimate.

The inspector assigned to traffic control on the project should number and date each sign, barricade, or drum as it arrives on the project to aid in maintaining an inventory for payment.

As stated in the specifications, a traffic control device once paid for is available for use on the project(s) throughout the life of the contract, at no additional cost to the Department or LPA, including repairing or replacing it. The Traffic Control Maintenance item reimburses the Contractor for its use once the device has been employed.

If the Engineer approves removal of all construction traffic control devices from the project(s) and it later becomes necessary to reemploy some of the devices, the payment and inventory requirement become reinitiated. An example of this situation would be as follows:

Paving of a project is completed and seal coating is to be done the following year. If the Engineer approves removal from the project(s) of all devices upon completion of paving, it will be necessary to pay the Contractor the following year to provide the required devices. Therefore, it behooves the Engineer to evaluate traffic control device requirements on subsequent phases of construction prior to authorizing their removal upon partial completion of the project.

Furnishing of traffic control devices by a subcontractor or by the Contractor has no bearing on how payment under this item is to be administered.

The diary will be used to verify traffic control maintenance, date, and explanation of work performed. Tickets or [ITD-0370](#) or [ITD-0371](#) Weekly Force Account sheets would be acceptable documents on a daily basis. Regardless of the means of documentation, concurrence on a daily basis of quantities must be verified by the Contractor representative's initials along with the Engineer representative's initials on the source document. According to the specifications, traffic control maintenance will be measured and paid for by the hours of authorized traffic control maintenance. Hours of traffic control maintenance will be reported to the nearest 0.5 hour. Any overtime for traffic control maintenance has no bearing when reporting hours worked for Contractor payment.

When a flag person sets up signs, that period of time will be paid as traffic control maintenance. There will be no payment for flagging during that same period of time.

Reports. None.

626.02 Flagging and Pilot Cars

General. Flag persons furnished by the Contractor to control traffic will be trained using a Department-approved course and have a valid flag person's card on their person. Idaho's cards are valid for three (3) years from the date of issue. The Department currently accepts all American Traffic Safety Services Association (ATSSA) and Evergreen Safety Council cards and cards issued in Washington, Oregon, Montana, and Utah (under a reciprocity agreement with these states), provided they have been issued within the last three years. The flag person's card must be verified and documented by diary entry, recording the card number, organization, and state that issued the card. It is strongly suggested that flag person's cards be scanned and electronic copies be placed in the project files.

Acceptable flagging equipment and attire, as described in the most current issue of the [MUTCD](#) as adopted by the State and the contract, must be used. **Flaggers are required to wear matching hats and vests at all times.** All equipment deemed to be inadequate should be rejected. A guide published by the ATSSA can be used to determine the serviceability of signs and some flagging equipment.

All pilot cars must be equipped with the proper signing and mounting, as designated in the current MUTCD as adopted by the State, and be properly mounted. The vehicles used for piloting must be in good running condition and be equipped with a roof-mounted, high-intensity rotating or strobe type amber flasher visible to both oncoming and following traffic.

Documentation for Determining Pay Quantities. The diary will be used to verify the activity, date, and work location. The [ITD-0370](#) or [ITD-0371](#), Weekly Force Account sheets, are acceptable documents for use on a daily basis. Other district-generated forms are also acceptable.

Regardless of the means of documentation, concurrence on a daily basis of quantities should be verified by the Contractor representative's initials along with the Engineer representative's initials on the source document.

According to the specifications, flagging will be measured and paid for by the hour of authorized flagging and pilot car by the hour of authorized operation. (e.g., if two pilot cars were authorized for six hours each, the pay quantity for that day would be 12 hours. Similarly, if two flaggers must flag traffic for an 8-hour period, payment is made for a total of 16 hours, even though a third flagger may have been employed for relief.)

Hours that are authorized for flagging and pilot car operation must not include show-up time or standby time. Hours of flagging and pilot car operation must be reported to the nearest 0.5 hour. Overtime for flaggers or pilot car operations have no bearing when reporting hours worked for Contractor payment unless they are being done separately under change order conditions. Flagging paddle and pilot car operating time are by pay units, not payroll hours.

Reports. None.

627.00 Painting.

General. Paint removal, disposal, and new painting specifications are changing because of environmental and personnel safety concerns. Field staff should thoroughly review each contract specification when involved in inspection of this type of work.

When the paint arrives at the job site, the inspector must check that the specified paint formula and system is being used.

Each District Materials Engineer has the "[Pictorial Surface Preparation Standards for Painting Steel Surfaces](#)," as well as the SSPC Painting Manual, Volume I, "Good Painting Practice," and Section 2, "Surface Preparation Specifications," from SSPC Painting Manual, Volume II. These three guides will be of great assistance in eliminating painting problems.

Painting must be performed under clean, dry conditions. Moisture on the surface will be trapped by the paint and prevent bonding. Moisture or dust in the air will cause a speckled or blotchy appearance. Cold weather also inhibits good bonding of the paint.

The new paint systems must be applied in accordance with the paint manufacturer's recommendations utilizing proper pressures, paint guns, and nozzles. Because of the quick-drying nature of some paints, the gun must be held close enough to the metal to get the paint to the metal in a moist condition and thereby ensure a sealing coat. Several conditions of improper application, thinning, extreme temperature can arise that will allow the paint to dry or be nearly dry upon contact with the metal. These undesirable conditions must be corrected immediately.

The painting must follow the sandblasting as quickly as possible. Generally, anything sandblasted one day should be painted with the prime coat the same day unless inside dry storage of the structural steel is utilized. If dew, rain, or other moist conditions dampen the near-white sandblasted steel surface, immediate rusting will occur, and the metal would require sandblasting again.

Inspection of steel that has been cleaned by sandblasting should verify that the surface meets the specified color or preparation. To ensure the proper thickness of paint on the steel surface, the dry film mil thickness must be checked by means of a gauge or meter. The inspector should document where the depth checks were made and choose checkpoints so as to check all types of surfaces.

Painting of the concrete will be required when noted in the special provisions, on the plans, or when initiated by change order. The concrete surface preparation must be an ordinary surface finish, as stated under SSHC [Subsection 627.03.E](#). The concrete must be cured by one of the methods designated under SSHC [Subsection 502.03.J](#). Painting will follow the manufactures recommendations for the best results.

Documentation for Pay Quantity. Painting will not be paid for separately unless otherwise provided. The diary will be used to verify the activity, date, and work location. Quantities and final measurements will also be documented by diary entry.

Reports. None.

628.00 Snow Poles.

General. Supplemental guidance to the [Standard Drawing](#) (628-1) for installing snow poles can be found in the [Traffic Manual](#), Section 261.

Documentation for Pay Quantity. The diary will be used to verify the activity, date, and work location. Quantities will also be documented by diary entry.

Snow poles will be paid for by the each unless otherwise indicated with acceptance by the RE letter or as otherwise specified.

Reports. None.

629.00 Mobilization.

General. Mobilization is an item to reimburse the Contractor for monies spent to initiate the start of a project including: bonding, insurance, and initial material acquisition.

Documentation for Determining Pay Quantities. SSHC [Subsection 629.05](#) is quite explicit on how the Contractor is to receive payment for the mobilization bid item. This specification does not allow payment for mobilization to exceed 10 percent of the total contract amount until completion of the project work.

Reports. None.

632.00 Removal of Bridge Deck Concrete.

General. Removal of bridge deck concrete can be complicated depending on project-specific situations. Consult with the Bridge Section if there are any major issues or questions regarding procedures to follow.

SSHC [Subsection 632](#) specifies requirements for removing concrete in the upper portion of the deck (Class A) followed by the selective removal of any remaining defective or deteriorated concrete (Class B). All exposed reinforcing steel must be cleaned and debris and water removed.

Before the Contractor begins removal operations, verify the following:

- All bridge drains have been plugged.
- Expansion joints and barrier curbs are protected.
- Milling of the overlay, if any, has been satisfactorily completed and accepted.
- The line separating deck sections where removal is not required (see plan sheets) has been saw cut to a depth approximately 75 percent of the planned removal depth. **Note:** care should be taken to avoid cutting any rebar.
- The hydro-demolition equipment shielding (typically rubber mats), used to prevent flying debris, is in good condition.
- Adequate protection (e.g. plywood sheets) has been provided to protect the public from flying debris both on and under the work site. Even when the equipment shielding is in good condition, aggregate and other debris can shoot out and travel quite a long distance.
- Provision for water and residual debris containment are adequate and prohibited from flowing into the vehicular and pedestrian traffic areas and into nearby waterways, also including under the worksite. Verify that any temporary collection ponds are lined with an appropriate material.

Class A Removal. Class A removal consists of the removal of all concrete from the top surface of the deck over the area shown on the plans to the mean depth limits shown on the plans. Removal may be accomplished by either hydro-demolition or mechanical means.

Before beginning Class A removal, a pre-operational meeting should be held with the Contractor. Topics to discuss include:

- 1) Size and type of equipment to be used. Equipment should be able to make a series of equal passes to remove the requisite width and depth of concrete.
- 2) Containment of debris and water runoff.
- 3) Methods for disposal of removed material.
- 4) Manufacturer representation.
- 5) Methods to be used for measuring Class A and B removal quantities.
- 6) Contractor is responsible for depth of cut adjustments during Class A removal. Any work required because of over or under removal or deck blow-outs is at no additional cost to the Department or LPA.

Hydro-demolition. Hydro-demolition involves the pressurization of water and the controlled delivery of a water jet to demolish the cement matrix between the concrete aggregate. It can attain a high production rate while removing concrete to the desired depth. The equipment consists of both a power unit and a demolishing unit. The power unit is typically housed in a large metal container on a flatbed trailer tractor. The demolishing unit is typically a microprocessor-controlled wheeled vehicle equipped with a water delivery nozzle. High pressure water is delivered from the power units to the nozzle by flexible hosing. If a water source is not readily available, a water supply truck is also required.

Do not allow any work to begin if:

- A qualified full-time representative of the manufacturer of the hydro-demolition equipment is not present and available as required by the specification. The representative is required on site during trial area removal and until the work is progressing satisfactorily.
- Documentation that the equipment is operated by qualified personnel trained by the manufacturer has not been provided.
- The Contractor does not have sufficient spare parts and service to maintain the operation of the equipment.

The Contractor must satisfactorily demonstrate that the equipment, labor, and methods of operations can achieve the specified Class A removal depth. The Engineer designates the location of the trial area and the trial area is then demolished until satisfactory removal (i.e., specified mean depth and as determined by the Engineer) is achieved. Reject any equipment and personnel that do not produce satisfactory results.

Locate the trial area within a uniform section of the deck that appears in good shape (i.e. sounder concrete where deterioration or delamination is not present). Make sure the trial area is not located in an area where previous patching is present. Patching material usually has a significantly higher strength than the original concrete and could result in an over-removal of Class A material.

Removal of both above and below (e.g., when patches or delaminated concrete are encountered) the mean depth is expected for this type of work, is included in the contract unit price for Class A removal, and is addressed in the specification:

- If the hydro-demolition removal extends beyond the mean removal depth where unsound concrete is encountered, the Department will still consider the work Class A removal at no additional cost to the Department.
- Remove concrete not removed to specified limits during hydro-demolition by mechanical means. This would be at no additional cost to the Department or LPA.

These points should be emphasized to the Contractor during the pre-operational conference.

The system operating parameters for Class A removal are established based on satisfactory removal of the trial area and is critical for ensuring that the mean removal depth is attained during production. The depth of cut is adjustable in several ways and includes:

- The rate of travel forward by the mill
- The rate of traverse on the cutting arm

- The size of orifice in the water jets
- The angle of their attack.

The depth of removal is normally adjusted using only the rate of travel by the forward mill. Document the trial area work in the construction diary and obtain a copy of the established operating parameters for the project files.

Verify that the equipment has begun moving prior to the actual removal. Monitor and document removal depths and overlap of equipment passes throughout production. Watch for areas of deteriorated concrete or patching. Some contractors try to reduce Class A patching removal and Class B removal requirements by setting the operating parameters higher than what is needed for the specified removal depth. This can result in an increase in deck blowouts because of excessive water pressure and increase the volume of material needed for the deck overlay. Patches frequently require removal by mechanical means because of its high strength. Verify that the contractor is adjusting for depth of cut appropriately during production. If not, stop work and discuss.

Also verify that the actual depth of the reinforcing steel is not higher than what is shown in the plans. The design intent of Class A removal is to take off the concrete surface that is above the top mat of reinforcing steel (though again some exposure is expected). The mean removal depth may need adjustment if the reinforcing steel was higher than what was shown in the plans.

Finally, ensure that the contractor is adequately supporting any exposed unsupported reinforcing steel following Class A removal and that it is protected from construction operations. Do not allow any equipment on unsupported reinforcing steel. Require the Contractor to repair any damaged reinforcing steel. The approved repair method is at no expense to the Department (or LPA).

Mechanical Removal. Class A removal by mechanical means is either by power-operated diamond grinding machinery or jackhammers. Diamond grinding is used in lieu of hydro-demolition while jackhammers are normally employed for removal of patching material, other discrete areas that may be higher than the specified removal depth, and areas inaccessible to the hydro-demolition equipment.

If diamond grinding is to be employed, contact the equipment manufacturer to verify equipment operating requirements for the specific project in question. Document the results in the project file.

Verify that equipment maximum ratings are not exceeded. See the specification for specific removal requirements.

Communicate to the Contractor the specification requirement that: If reinforcing steel is exposed, immediately stop work and request instructions from the Engineer. The Engineer should then evaluate the best method(s) for protecting the reinforcing bar from being damaged or de-bonded from the concrete. This may require changing the type of jackhammer bit or raising the grinder teeth to avoid nicking the reinforcing bar.

Runoff and Cleaning. The demolished concrete and water combine into a mixture of rubble, slurry, and excess water that must be contained and removed. See SSHC [Subsection 632.03](#) for containment and removal requirements. Do not allow brooming as an option for cleaning. Brooming does not effectively remove fine particles.

Ensure that the cleaning is timely (i.e. promptly follows removal), so that the material is not allowed to dry. If the material is allowed to dry, it will adhere to the deck and become extremely difficult to remove. Regardless, the deck must be completely cleaned of all debris and water to ensure that a clean, bondable surface remains.

Cleaning of Exposed Reinforcing Steel. Also included in Class A removal is cleaning any exposed reinforcing steel of rust, scale, and corrosion. This is necessary so that the new deck overlay material will bond with the steel. The hydro-demolition operation typically removes a majority of rust, scale, and corrosion but the Contractor may still have to employ additional methods such as sandblasting. Verify that the steel has been adequately cleaned.

Class B Removals. Class B removal is comprised of removing:

- 1) Localized areas of deteriorated concrete remaining after Class A removal
- 2) Concrete around de-bonded reinforcing steel.

Areas for removal are designated by the Engineer and should be clearly marked in the field. Verify that equipment maximum ratings are not exceeded. See the specification for specific removal requirements.

Remember, partially exposed reinforcing steel does not automatically mean it is de-bonded. Verify bonding conditions before requiring removal. Removal of concrete around bonded reinforcing steel tends to cause loosening ahead of the process and could result in excessive removal.

Documentation for Pay Quantities. Payment for both Class A and B removal is by area and require field measurements. Provide the Contractor with quantity computations regularly throughout the work. Quantities and computations can be reported via the construction diary, the pay item report, or the [ITD-0404](#) form.

Reports. Document all discussions, work activities, including locations and depth of removal verifications, in the construction diary. Supplement with photographs and videos, especially if any issues or irregularities occur.

633.00 Construction Maintenance During Winter Suspension.

General. If winter maintenance is required for a construction project, a pre-suspension meeting must be held between the Engineer and the Contractor to determine the level of maintenance on the roadway during suspension. The equipment, work force, and materials necessary for the maintenance will be determined at this time. All equipment being used and paid for must be available at all times and materials necessary for repairs must be readily available.

All actual loaded labor costs to the Contractor for this work must be paid for, including travel time (actual costs).

Payment for any work accomplished by a piece of equipment during a one-month period will not amount to less than the equivalency of 100 percent of the owner's monthly equity rate.

Documentation for Pay Quantities. The diary will be used to verify the activity, date, and work location. Weekly force account sheets should be kept in duplicate and signed by both parties.

Reports. None.

634.00 Mailbox.

General. Mailboxes and their supports must meet the Departments' minimum standards for construction as shown in the ITD [Standard Drawings](#). ITD Standard Drawings 634-1 and 634-2 reference mailbox details. Mailboxes and newspaper appurtenances can be a safety hazard depending on the cross-section dimensions of the highway, sight distance, the impact resistance of the support, traffic volume, and if vehicles must occupy a portion of the travel way when accessing the mailbox.

If possible, the mailbox and support should be erected with the following considerations in mind:

- Easy access in an area not exposed to traffic
- Good sight distance in advance of the mailbox
- Be of the nature and type that does not present a hazard if struck by a vehicle and contains supports that break away safely if struck.

Current postal regulations should be consulted for specific set-back requirements applicable to the area and roadway type involved. Additional guidance on mailbox installations can be found in the latest edition of [AASHTO A Guide for Erecting Mailboxes on Highways](#).

Documentation for Pay Quantity. The diary will be used to verify the activity, date, and work location. Quantities and final measurements will also be documented by diary entry.

Excavation and compacting backfill work related to the mailbox installation is considered incidental unless otherwise specified.

Reports. None.