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1. CLEARING

Clearing is defined as the cutting, dozing or other means of removing trees, logs, brush, shrubs, stumps and debris from the required work area. Grubbing is defined as the removal of tree stumps and roots from below the ground surface. Snagging is defined as the removal of loose debris, stumps, logs and fallen trees from an area without disturbing the existing sodded conditions.

The Contractor will clear the required right-of-way, including spoil deposit areas, at least 1/2 mile in advance of the excavating operation. Trees 6 inches in diameter or larger may be left in the right-of-way provided they do not interfere with the construction operation.

When specified on the plans and bid as a separate item, the Contractor will be required to salvage all merchantable timber in accordance with the details found in Section 2.01.05 of the MDOT Specifications. If timber salvage is not specified, the landowner will be given reasonable notice so that he may, at his option, cut and remove the merchantable timber before the clearing operation, otherwise, all timber will be treated as debris and disposed of as required.

The Contractor will obtain written approval from the landowner before removing any merchantable timber from the site. No fruit trees will be removed unless the landowner approves. The Contractor will investigate for himself what trees and brush must be removed. When directed by the "OWNER", an occasional tree will be left standing unless it interferes with the construction, maintenance and/or the functioning of the drain.

The Contractor will clear, snag and grub that portion of the drain to be excavated. Unless otherwise specified, on drain slopes that will not be disturbed by the excavating operation, trees and brush will be cut and not grubbed. The Contractor has the option of spraying small finger size trees and brush rather than cutting them off.

Unless otherwise specified:

a. If a minimum of 12 inches of spoil cover cannot be placed over all cut-off stumps, then stumps and brush are to be sprayed.

b. Where spoil is to be deposited on one side only and access for maintenance purposes is necessary on the opposite side, the Contractor will be required to clear by cutting or grubbing a 12 foot wide strip on the opposite side and spray stumps and small brush. If access for maintenance purposes is not necessary, the Contractor shall be required to remove from the 12 foot wide strip only those diseased or dead trees in jeopardy of falling into the drain.

c. Stumps will be basal sprayed and brush will be foliage sprayed with approved herbicides. The carrier mixed with the herbicide will be in accordance with the directions of the chemical manufacturer and will be colored with an approved water-soluble colored dye.

Spraying will be performed only by a properly trained and licensed sprayer. Spraying of stumps will be done as soon as possible after the cutting operation but no later than 24 hours and will be applied according to the spray manufacturer recommendations.

When trees and brush are cut off, they will be cut off as close to the ground as possible, but no higher than six inches.

2. DEBRIS MANAGEMENT

Unless otherwise specified, all combustible debris will be burned and/or buried in compacted trenches with a minimum of 24 inches of cover or removed from the site and disposed of as approved by the engineer. Burning will be in accordance with applicable laws regarding open fires. The Contractor is responsible for obtaining all necessary burning permits from the local controlling units of government. No burning or piling will be allowed within 200 feet of any overhead public utility line. When burning is specified and areas of organic soils are encountered, the combustible debris will be either removed from the site or moved to areas of mineral soils before burning.

Tree stumps packed with soil that are grubbed intact with the entire tree may be placed in burning piles provided there is sufficient other combustible material in the pile to assure a good burn. Otherwise, all non-combustible debris, cut-off stumps packed with soil or the remains of any burning piles will be either buried with at least 24 inches of cover or removed from the site. When burning is not specified, all combustible debris will be neatly piled and placed at intervals of not less than 100 feet with clearances as shown in the standard details. When a property line falls within the drain top width, the debris piles shall be placed equally on both sides unless otherwise approved by the "OWNER".

Debris piles will be kept reasonably free of soil and non-combustible debris. In wooded areas, when burning is not specified, debris may be windrowed behind the spoil piles in a neat row with a minimum of 8 feet of clearance between the debris and the wooded areas and between the debris and the spoil piles.

3. EXCAVATING

The Contractor will excavate the drain to the dimensions and cross sections specified in the plans. No change in grade or dimensions will be made without the "OWNER'S" permission. The Contractor shall closely adhere to proposed grades in reaches 300 feet below and above any bridge, culvert or rockford crossing. In no case shall the bottom grade be more than 0.5 feet below planned grade in these areas. Any excavations below this depth on the downstream end of culverts will be filled with approved size and type of rock as directed by the engineer as a incidental cost to the Contractor.

If unstable soils are encountered, the Contractor will ask the engineer to specify the changes necessary to provide slope and grade stability. Any additional excavation on account of these changes will be paid for at a price agreed upon before the changes are made.

Any ledge rock encountered during the excavations will be brought immediately to the attention of the engineer, who, in consultation with the "OWNER", will prepare alternate plans for the reach involved. Use of explosives will require special approvals and additional insurance coverage.

4. PILOT CHANNELS

When called for on the plans or when wet or unstable soils are encountered, the initial construction of the drain will be the excavation of a pilot channel to be excavated at least 30 days in advance of completing final drain side slopes. The engineer will determine when drain slopes have stabilized sufficiently to allow for final slope shaping.

The pilot channel excavation will have a bottom width of approximately one-half the proposed final width (minimum 4 feet) with 1:1 side slopes and will be excavated to the proposed design grade. The pilot channel will not be excavated upstream from any bridge requiring bridge protection work or replacement until the scheduled work for such bridge has been completed, unless otherwise approved by the engineer.

5. SEDIMENT SUMPS

When called for on the plans or at the Contractor's discretion, sediment sumps will be constructed at strategic locations to trap the sediments moving downstream during construction.

When specific dimensions are not given on the plans, sumps will consist of over-excavating the drain grade by one to two feet with 1.5:1.0 side slopes. The sumps will be at least 200 feet long, depending upon site conditions, but shall not be located within 300 feet of any crossing. If directed by the engineer, sediments accumulated during construction will be removed from sumps periodically during construction and upon project completion.

6. CHANNELS PARALLEL TO ROADS

Unless the plans require the drain to be set back from the road, all excavations will be made from the slope on the field side of the drain. On the undisturbed slope adjacent to the road, the Contractor will handle trees and brush as specified in Section 1 of these specifications.

When the existing roadside ditch is to be abandoned and filled, select materials from the excavations will be used as fill and carefully compacted in place with suitable equipment.

At the option of the Road Commission for Oakland County and if right-of-way allows, spoil may be ordered placed on the opposite side of the road and leveled. In some cases, the road itself may be raised.

Where farm outlet roads occur along the side of the drain, spoil may be placed on the opposite side of the farm road and leveled in a manner to save existing travel surfaces.

7. OPENINGS THROUGH SPOIL

No spoil will be deposited in an existing tributary watercourse or drain. Openings will be left or made through the leveled spoil at places where the general ground surface indicates an opening is necessary for the passage of surface water to the drain.

8. WATERCOURSES

When called for on the plans, major watercourses, side drains and road ditches will be graded out as shown on the standard details at designated locations. In some instances, road ditches may have to be realigned to avoid interference with the ends of the road culvert.

9. SPOIL LEVELING

Normally, except for minor cleanouts, or unless otherwise directed by the "OWNER", spoil material will be equally placed on each side of the drain. In reaches where spoil was placed all on one side the last time the drain was excavated, the newly excavated spoil shall be placed on the opposite side. The Contractor shall coordinate this with the landowners. In case of landowner disagreements concerning which side spoil should be placed, the "OWNER" shall decide. All old or newly excavated spoil deposited on or adjacent to improved or tillable farmland will be leveled as specified in the standard details. In reaches where only clearing and snagging is to be done, old spoil banks shall be cleared and leveled as is necessary to facilitate the overall operation.

Leveling will be done with suitable equipment in order that the landowner can work or till the spoil with normal farm equipment. The spoil will be uniformly sloped away from the channel. In wooded areas, old and new spoil banks will be piled, leveled and left in a condition suitable for travel by farm equipment.

Unless otherwise specified, when spoil is to be deposited on unstable organic soils, a 15-foot wide berm will be maintained at all times during construction between the top edge of the drain and the excavated spoil.

Combustible brush or debris must never be mixed in with leveled spoil materials. A minimum of 12 inches of cover will be placed over any cut-off stumps, and the Contractor will bury with 24 inches of cover all rocks 12 inches or more in diameter which are excavated from the drain.

Special attention will be given to prevent the trapping of water behind the leveled spoil. In such cases, extra shaping of the spoil and the area behind it may be necessary.

Spoil from that portion of the drain adjacent to landscaped areas, where there is no suitable place to deposit the spoil, will be deposited on adjacent unlandscaped areas of right-of-way or will be hauled away and disposed of as directed by the "OWNER".

10. CULVERT INSTALLATION

New culverts or culverts to be relayed will be placed by the Contractor as directed by the engineer according to the standard details and in accordance with the requirements of the highway agency having jurisdiction. The Contractor shall determine for himself what the requirements of the agency are for permits, insurance, bonds, barricading, backfilling; financial responsibility for imposed inspection fees, surface replacement or any other special requirements. Requirements of this section will also apply to the installation of C.S.P. for erosion control structures. Unless otherwise specified, culvert wall thickness requirements shall meet Class "B" criteria in Section 8.08.07. of the MDOT Specifications.

Special care will be taken in removing, salvaging, storing, handling or placing new culverts or culverts to be relayed so that they are not dented, scraped or the galvanized coating otherwise damaged. When placing larger diameter or longer length culverts, suitable left rings will be shop attached to facilitate handling. Lift holes cut in the C.S.P. will <u>not</u> be allowed. Saw cut ends of the C.S.P. shall be reasonably free from excessive jagged burrs or sharp spurs. The Contractor shall promptly repair any damaged coatings in accordance with the manufacturer recommendations.

Unless otherwise noted, all existing C.S.P. shown in the plans are assumed to be the standard annular, riveted, 2 2/3" x 1/2" corrugations. When existing culverts are to be extended, the Contractor shall, before ordering the new C.S.P. extensions, field check the existing culvert to determine the exact size and type so that the new extension will be compatible and properly joined together. Any special banding techniques proposed by the Contractor shall have the prior approval of the engineer.

a. Corrugated steel pipe shall be provided, corresponding to the diameter or arch shape (rise and span) as specified on the plans.

b. Gauge thickness shall be as specified on the plans.

c. A paved invert shall be provided if specified on the plans.

d. All corrugated steel pipe shall be galvanized and coated with bituminous asphalt to retard corrosion. As an alternate to this requirement, and aluminized steel pipe, or approved equal, may be substituted.

e. All corrugated steel pipe shall be joined together with a watertight circumferentially corrugated steel-coupling band furnished with two (2) rubber gaskets.

f. Corrugated steel pipe shall have welded spiral seams with helical corrugations. Each end of the helical corrugated pipe shall be re-rolled to an annular configuration to accommodate the watertight coupling band described herein. Riveted or lock seam steel pipe is unacceptable.

g. All pipe connections to the side wall of main-line corrugated steel pipe shall be of the diameter specified on the plans, and shall consist of similar steel pipe that connects or taps into the main-line pipe wall using a pre-fabricated saddle plate.

When two or more culverts are laid parallel in the same trench, the spacing between them will be as follows:

a. Round pipe 48-72" in diameter --- 1/2 diameter of pipe.

b. Pipe arch 36-108" span --- 1/3 span of pipe arch.

c. Round pipe over 72" & pipe arch over 108" --- 36" spacing.

In all cases, sufficient spacing will be left to allow room to thoroughly tamp the backfill under and around the culvert. Smooth transitions shall be excavated on the drain bottom width and side slopes upstream and downstream from culvert installations involving larger diameters or multiples when existing round culverts are to be relayed, the inverts shall be rotated 180°.

All culverts will be placed on a stable earth or granular foundation, free of all sod, frozen earth, boulders or rocks. The trench or streambed will be shaped to fit the bottom of the culvert to line and grade.

Select backfill material will be placed under the haunches, around the culvert and over top of the culvert in alternate six-inch layers on both sides of the culvert. Thorough tamping of each layer of backfill material will be accomplished by use of a vibrating compactor, hand tamping or mechanical tamping equipment, depending on field conditions.

Construction equipment will not be allowed to cross the culvert until it is completely backfilled and compacted up to finish road elevation. Backfilling methods will conform to Section 2.09 of the MDOT Specifications. The Contractor will refill all backfilled areas which settle before final acceptance.

Unless otherwise specified, backfill over all culverts will be of sufficient depth to provide a minimum of 12 inches of cover for equivalent pipe sizes up to and including 84", 18 inches for equivalent pipe sizes to and including 102" and 24 inches for 108" and larger. The backfill shall be crowned and shaped to divert surface water runoff to prevent erosion over the end slopes. Backfill top widths and end slopes will be as specified in the construction notes on the standard details.

All disturbed areas shall be restored in accordance with provisions of Section 8. Final Cleanup and Restoration of the General Specifications.

Roads, streets, drives, and pavements shall be restored in accordance with provisions of Section 13, Maintenance and Restoration of Road Surfaces. Structures and Trench Backfill, and Section 14. Replacement of Concrete or Asphalt Pavement Crossings, both of the General Specifications.

11. WEB JOIST BRIDGES

The minimum length of piles shall be 10 feet. Piles shall be driven to near point of refusal or a additional length shall be driven if necessary to provide bearing strength for the loading required. Additional length may also be required to meet the minimum under clearance elevation or approach grade requirements. All piles shall be AISC designated W6 x 20 (W shape, 6 1/4" depth, 6" flange width, 3/8" flange thickness, weight of 20 lbs./lin. ft.). Both headers shall be W6 x 15.5 (6" depth, 6" flange width, 1/4" flange thickness, and weight of 15.5 lbs./lin. ft.).

The web joists will be fabricated according to the AISC Code of Standard Practice for Steel Buildings and Bridges and the Steel Joist Institute. If requested, the Contractor shall furnish shop drawings showing all members in the web joist with stress diagram and loading detail before construction begins. The grade of steel used will conform to the ASTM Standard Specification A-36. All joints of the joist will be made by electric arc welding according to the latest standards of the American Welding Society Code.

The joists will be handled and stored carefully in accordance with the manufacturers recommendation, since they are only strong in the vertical position and then only when adequately bridged. All joists will receive one shop coat of standard rust inhibitive paint before shipping and all field welds will be painted similarly.

The backwall and wingwall are to be either timber planking, 2" x 6" to 14" width with majority in 8" to 10" range, min. 10 feet long spliced only at pile locations, or 8 ga. Armco (or equal) steel sheeting, 6' long min., 18" wide with 2.67 section modules, or 3" concrete slab reinforced with standard wire mesh.

If a concrete deck is constructed, it shall be reinforced with standard wire mesh. The deck surfaces shall have a rough broomed finish. The forming material placed across the joist before pouring shall be strong enough to carry the load of the concrete without buckling.

All timber used will be seasoned native hardwoods, free from major defects. The deck planking, skid rail and bottom plate will be rough sawed white oak. The backwall and wingwall lumber will be pressure treated using standard mill type techniques.

All parts of the bridge structure must be securely joined together either by welding or bolting as noted. Holes will not be drilled or burned through the joist flanges.

12. BAG RIPRAP

When called for on the plans, bag riprap will be placed on the ends of the culverts according to the standard details. Bags used will be of at least 10-ounce burlap (or approved equivalent), properly sewn and each having a capacity of at least one cubic foot. The length of each bag will be approximately twice the width.

Concrete used in the bag riprap will conform to Grade "30P" as defined in Section 7.01 of the MDOT Specifications or as approved by the engineer. The concrete will be placed in the bags with a moisture content to produce a 1 1/2" slump. Riprap installed during cold weather will be adequately protected from freezing.

The bag riprap shall be reinforced with No. 4 reinforcing rods each 18 inches long. The rods shall be driven on a batter into the bags immediately after placement. The rods shall be spaced 12 inches apart the full height of the installation across the entire width of the headwall. The rods shall overlap by 6 inches.

The placement of bag riprap in excess of the quantities shown on the plans will be allowed only when adequately justified and authorized by the "OWNER".

13. BRIDGE UNDERPINNING

Bridges to be underpinned with steel piling or concrete will be done according to the sketches shown on the plans. The Contractor will submit his plan of operation to the engineer for approval two weeks in advance of beginning work on a bridge.

All underpinning will be completed before any excavation is allowed upstream from a bridge. The maximum length of a concrete segment poured at any one time will be eight feet and will have a minimum set time of 72 hours before any adjacent segment is excavated. The concrete will meet the requirements of Section I-R of these specifications.

14. TILE OUTLETS

With a minimum of 3 days notice to be given by the Contractor, landowners will locate and flag the location of all known drain outlets to be protected during the excavating operation.

The Contractor will be responsible for leaving the drain outlets in good repair and in working order. When existing drain outlets are left in place, it may be necessary to shorten their length and recess them back into the newly shaped slope.

When called for on the plans, new C.S.P. drain outlets will be installed according to the standard details. The new C.S.P. may be the same size as the existing outlet provided an additional 1% slope can be obtained on the new C.S.P., otherwise the size of the new C.S.P. will be increased by one pipe size.

Interior lap seams on the new C.S.P. will be placed in the direction of water flow. A suitable rodent guard shall be placed on the end of the new drain outlet.

When it is apparent a drain outlet is carrying human or animal waste materials from a home or barnyard area, County Health Department approval will be requested before reconnecting the outlet to the drain.

15. ROCKFORD CROSSING

Exact location of rockford crossings shall be determined in the field by the engineer during construction after consultations with the landowners. Field adjustments shall be made when, during the excavation operation, unstable soils are encountered at the planned locations.

The ramps shall be no steeper than 8:1. The sides of the ramp shall be sloped at 1.5:1 unless otherwise specified. Upon completion, all exposed earth surfaces of the rockford shall be fertilized and seeded.

Rock used in construction of the rockford shall be Bayport Quarry #4 ballast stone (majority in 1 1/2" to 2" range) or an equal approved by the engineer.

The ramps shall be surfaced with 12 inches of rock. The bottom level portion of the rockford shall have rock to a depth of 24 inches.

Rockfords shall be bid and paid for on a lump sum basis. Such payment will be considered full compensation for all excavation, labor and materials necessary in the performance of the work.

16. SLOPE PROTECTION

When called for on the plans, slopes will be protected by the placement of specified materials according to methods in Section 6.01 of the MDOT Specifications. Stone, rock or broken concrete materials shall be in accordance with Section 8.19 of the MDOT Specifications.