

**Camp Lake # 41-4 & Muskellunge Lake # 59-10
Boating Access Site Paving**

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DIVISION TWO – SITE WORK

SECTION 02000

MOBILIZATION / DEMOBILIZATION

PART ONE – GENERAL

1.01 DESCRIPTION

- A. This item shall consist of preparatory work and operations, including, but not limited to, those necessary for the movement of personnel equipment, supplies, and incidentals to the project site; for the establishment of the contractor's offices, buildings, and other facilities necessary to undertake the work on the project; and for other work operations which must be performed, or for expenses incurred, prior to beginning work on the various contract items on the project site.
- B. In addition, Demobilization is to include the safe removal of all of the above (Section A.) without interference, damage, or impact upon the completed project and all essential elements.

1.02 METHOD OF PAYMENT

- A. All work under this section is included in the contract lump sum price. A line item should be included in the Schedule of Values breakdown as a part of the total Lump Sum proposal.

END OF SECTION

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- a. Contractor shall submit a detailed schedule of installation, maintenance and removal dates for all required SESC measures. A schedule form is included at the end of this section.
- 3. Maintenance procedures for Temporary SESC Measures.
- 4. Maintenance Procedures for Permanent SESC measures.
 - a. Contractor will be responsible to maintain these measures until they are permanently established and the soil is stabilized.

1.06 RELATED SPECIFICATIONS

- A. Section 02900 RESTORATION

1.07 METHOD OF PAYMENT

- A. All work under this section is included in the contract lump sum price. No separate payments will be made for this work.
- B. Dust Control and sweeping as required by this specification shall be incidental to other items in this contract, and no separate payment shall be made for these items

PART TWO - MATERIALS

2.01 GENERAL

- A. All materials required for the SESC measures shall be as specified by the MDMB Soil Erosion and Sedimentation Control Guidebook 2002, and by Section 916, and Section 917 of the MDOT Standard Specifications for Construction, 2003 Edition.
- B. Seed Mulch shall be as specified in Section 02900

PART THREE - EXECUTION

3.01 INSTALLATION AND MAINTENANCE OF CONTROLS

- A. General
 - 1. All SESC measures shown on the plans shall be installed and maintained in accordance with the MDMB Soil Erosion and Sedimentation Control Guidebook 2002, unless otherwise specified or approved by the Engineer.
 - 2. All required SESC measures shall be in place as required by the approved SESC plan prior to construction.
 - 3. Daily inspections shall be made by the contractor to determine effectiveness of erosion and sedimentation measures, and any necessary repairs shall be performed without delay.
 - 4. Permanent soil erosion control measures over disturbed land area shall be completed within 5 working days after final grading or final earth change has been completed.
- B. Dust Control
 - 1. Inspector reserves the right to require that dust control be applied as necessary to protect adjacent property and the waters of the state. Dust shall be in accordance with the MDMB Soil Erosion and Sedimentation Control Guidebook 2002.

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- C. Sweeping
 - 1. Inspector reserves the right to require sweeping as necessary to protect adjacent property and the waters of the state. Sweeping shall be in accordance with the MDMB Soil Erosion and Sedimentation Control Guidebook 2002.
- D. Seeding and Mulching
 - 1. Seeding and mulching shall be in accordance with Section 02900 – Landscaping.
- E. Silt Fence
 - 1. Install silt fence as shown in the approved SESC plan and in accordance with the MDMB Soil Erosion and Sedimentation Control Guidebook 2002, unless otherwise shown on the plans or approved by the Engineer.

3.02 COMPLETION

- A. The contract will not be considered complete until the Engineer has certified the following items.
 - 1. All disturbed soil is permanently stabilized.
 - 2. All sewers, ditches, catch basins, and manholes and roadways are cleaned and cleared of sediment. Unless the contractor can document positively to what extent these items are silted prior to construction, no credit will be given for cleaning these items.
 - 3. All temporary SESC measures have been removed and the areas are restored and stabilized.

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**SOIL EROSION AND SEDIMENTATION CONTROL MEASURES
INSTALLATION, MAINTENANCE AND REMOVAL SCHEDULE**

SESC MEASURE	INSTALLATION DATE	REMOVAL DATE	MAINTENANCE FREQUENCY

END OF SECTION

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SECTION 02230

SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Protecting existing trees, shrubs, groundcovers, plants, and grass to remain.
2. Removing existing trees, shrubs, groundcovers, plants and grass.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Removing above- and below-grade site improvements.
6. Disconnecting and capping or sealing site utilities.

1.2 QUALITY ASSURANCE

- A. The contractor shall insure that only those trees that are obstructing the work area are removed. Trees beyond the work area shall be protected.
- B. Tree removal shall be done using only workmen skilled in this type of work.

1.3 MATERIAL OWNERSHIP

- A. Except for stripped topsoil or other materials indicated to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.4 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
- B. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.
- C. The contractor shall protect all existing utilities indicated or made known. Call "MISS-DIG" or other service as needed to identify utility locations. Utility line markers placed by the Architect/Engineer and MISS DIG shall be protected by the contractor and replaced at his expense.
- D. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place. Requirements for erosion and sedimentation control measures are specified in Division 2, Section "Soil Erosion and Sedimentation Control."

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1.5 METHOD OF PAYMENT

- A. All work under this section is included in the contract lump sum price. No separate payments will be made for this work.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Division 2, Section "Earth Moving."
 - 1. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. The Contractor shall thoroughly inspect the premises prior to commencing work. The Contractor shall also determine the extent of work and the number and size of trees to be removed.

3.2 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Protect existing site improvements to remain from damage during construction.
 - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.3 TREE PROTECTION

- A. Extreme care should be taken to avoid damage to trees including seedlings and saplings. No damage is acceptable to existing trees with in the park (defined as breaking of the bark, broken tops or bending of trees from their natural position). Should damage occur, repairs shall be made at the contractor's expense in accordance with, and at the direction of, the engineer and DNR Forestry standards.
- B. Erect and maintain temporary fencing around tree protection zones before starting site clearing. Remove fence when construction is complete.
- C. Do not excavate within tree protection zones, unless otherwise indicated.
- D. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by Engineer.

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3.4 UTILITIES

- A. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.
 - 1. Arrange with utility companies to shut off indicated utilities.
 - 2. Notify Engineer not less than two days in advance of proposed utility interruptions.
 - 3. Utility lines which have been identified on the plans or on-site and then are damaged or disturbed by the contractor shall be repaired or replaced at no expense to the state.

3.5 CLEARING AND GRUBBING

- A. The contractor shall take care when removing trees to avoid damaging existing structures, roads, utilities, other trees, and state property. Tree removal shall be done only when all parking spaces within 300 feet of the work area have been vacated. The contractor shall insure that non-construction employees are kept clear of the removal area at all times.
- B. Where trees indicated to be removed cannot be felled without danger to other trees, structures or property, they shall be cut down in sections.
- C. Tree roots 1" in diameter and larger shall be removed to the trench depth required for the utility installation. In areas where pavement is to be constructed tree roots shall be removed to at least 12" below the existing ground surface or sub-grade of new graded surface, whichever is lower.
- D. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
 - 1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

3.6 TOPSOIL STRIPPING

- A. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
- B. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.
- C. DISPOSAL
 - 1. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.
 - 2. All brush, tree branches, roots, and tree stumps shall be removed from the state land and disposed of off site. Non-vegetative material shall be removed from state park lands and disposed of in an approved landfill. Debris will not be allowed to accumulate on the job site.
 - 3. Burning of combustible materials will not be permitted on state park lands.

END OF SECTION 02230

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SECTION 02300

EARTHWORK

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Preparing sub-grades for slabs-on-grade, walks, pavements, lawns and grasses.

1.2 DEFINITIONS

A. Backfill: Soil material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Bedding Course: Course placed over the excavated sub-grade in a trench before laying pipe.

C. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

D. Excavation: Removal of material encountered above sub-grade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below sub-grade elevations or beyond indicated lines and dimensions as directed by Engineer. Authorized additional excavation and replacement material will be paid for according to Contract provisions changes in the Work.
2. Unauthorized Excavation: Excavation below sub-grade elevations or beyond indicated lines and dimensions without direction by Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be without additional compensation.

E. Fill: Soil materials used to raise existing grades.

F. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

G. Sub-base Course: Course placed between the sub-grade and a cement concrete pavement.

H. Sub-grade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below sub-base, drainage fill, or topsoil materials. Sub-grade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below sub-base, drainage fill, or topsoil materials.

I. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

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1.3 PROJECT CONDITIONS

1.4 Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Engineer and then only after arranging to provide temporary utility services according to requirements indicated.

1.5 METHOD OF PAYMENT

- A. All work under this section is included in the contract lump sum price. No separate payments will be made for this work.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: ASTM D 2487 Soil Classification Groups GW, GP, GM, SW, SP, and SM, or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.
 - 1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
- D. Sub-base Material: Granular Material shall meet MDOT Standard Specification (2003 Edition) Section 902.08 for Class II Material.
- E. Bedding Course: Granular Material shall meet MDOT Standard Specification (2003 Edition) Section 902.08 for Class II Material.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- B. Preparation of sub-grade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Division 02 Section "Site Clearing."
- C. Protect and maintain erosion and sedimentation controls, which are specified in Division 02 Section "Soil Erosion and Sediment Control" during earthwork operations.

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3.2 EXCAVATION

- A. Unclassified Excavation: Excavate to sub-grade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
 - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

3.3 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
 - 1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

3.4 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and sub-grades.

3.5 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.
 - 1. Clearance: 12 inches each side of pipe or conduit.
- C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape sub-grade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench sub-grade.
 - 1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material, 4 inches deeper elsewhere, to allow for bedding course.

3.6 SUBGRADE INSPECTION

- A. Proof-roll sub-grade below the building slabs and pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated sub-grades. (Notify engineer 48 hours in advance for inspection)
- B. Reconstruct sub-grades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Engineer, without additional compensation.

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3.7 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Engineer.
 - 1. Fill unauthorized excavations under other construction or utility pipe as directed by Engineer.

3.8 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.9 UTILITY TRENCH BACKFILL

- A. Place backfill on sub-grades free of mud, frost, snow, or ice.
- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- C. Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Division 03 Section "Cast-in-Place Concrete."
- D. Place and compact initial backfill material, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the utility pipe or conduit.
 - 1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
- E. Place and compact final backfill of satisfactory soil to final sub-grade elevation.

3.10 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
 - 1. Under grass and planted areas, use satisfactory soil material.
 - 2. Under walks and pavements, use satisfactory soil material.

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3.11 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate sub-grade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
 - 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
 - 2. Remove and replace, or scarify and air dry otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.12 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 1557:
 - 1. Under structures, building slabs, steps, and pavements, compact top 12 inches of existing sub-grade and each layer of backfill or fill soil material at 95 percent.
 - 2. Under walkways, compact top 6 inches below sub-grade and each layer of backfill or fill soil material at 92 percent.
 - 3. Under lawn or unpaved areas, compact top 6 inches below sub-grade and compact each layer of backfill or fill soil material at 85 percent.
 - 4. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.

3.13 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
- B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish sub-grades to required elevations within the following tolerances:
 - 1. Lawn or Unpaved Areas: Plus or minus 1 inch.
 - 2. Walks: Plus or minus 1 inch.
 - 3. Pavements: Plus or minus 1/2 inch.
- C. Grading inside Building Lines: Finish sub-grade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.14 SUBBASE COURSES

- A. Place sub-base course on sub-grades free of mud, frost, snow, or ice.
- B. On prepared sub-grade, place sub-base course under pavements and walks as follows:

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1. Shape sub-base course to required crown elevations and cross-slope grades.
2. Compact sub-base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight.

3.15 FIELD QUALITY CONTROL

- A. Testing Agency: Contractor will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing. (Cost is to be included in the base bid.)
- B. Footing Sub-grade: At footing sub-grades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing sub-grades may be based on a visual comparison of sub-grade with tested sub-grade when approved by Engineer.
- C. Testing agency will test compaction of soils in place according to the Nuclear Density Method ASTM D 2922, or other approved method.
- D. When testing agency reports that sub-grades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; re-compact and retest until specified compaction is obtained.

3.16 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.17 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION

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SECTION 02332

AGGREGATE BASE COURSE

PART ONE - GENERAL

1.01 DESCRIPTION

- A. Work included: The work under this Section includes, but is not necessarily limited to, all labor, materials, and equipment necessary to construct an aggregate base coarse of the required depth as indicated on the drawings and specified herein.

1.02 QUALITY ASSURANCE

A. Subgrade:

- 1. The subgrade shall be inspected and approved by the engineer prior to placing conditioning aggregate.

B. Materials:

- 1. All materials used for aggregate base shall be approved by the Architect/Engineer, prior to placement.

C. Compaction:

- D. Field determination of in place density shall be by the Nuclear Density Method, ASTM D-2922, or other approved method.

1.03 MEASUREMENT AND PAYMENT

- 1. All work under this section is included in the contract lump sum price. No separate payments will be made for this work.

PART TWO - PRODUCTS

2.01 MATERIALS

A. Aggregate Base Material:

- 1. Shall be 22A aggregate as specified in MDOT (2003 Ed.) Standard Specifications, Section 902.

PART THREE - EXECUTION

3.01 CONSTRUCTION METHODS

A. Aggregate Base Coarse

- 1. Aggregate base course shall be constructed as specified in MDOT (2003 Ed.) Standard Specifications, Section 302.

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3.02 FIELD QUALITY CONTROL

- A. Testing Agency: Contractor will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing. (Cost is to be included in the base bid.)
- B. Footing Sub-grade: At footing sub-grades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing sub-grades may be based on a visual comparison of sub-grade with tested sub-grade when approved by Engineer.
- C. Testing agency will test compaction of soils in place according to the Nuclear Density Method ASTM D 2922, or other approved method.
- D. When testing agency reports that sub-grades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; re-compact and retest until specified compaction is obtained.

END OF SECTION

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SECTION 02335

AGGREGATE SHOULDERS

PART ONE - GENERAL

1.01 DESCRIPTION

- A. Work included: The work under this Section includes, but is not necessarily limited to, all labor, materials, and equipment necessary to construct two foot wide aggregate shoulders of the required depth as indicated on the drawings and specified herein.

1.02 METHOD OF PAYMENT

- A. All work under this section is included in the contract lump sum price. No separate payments will be made for this work.

PART TWO - PRODUCTS

2.01 MATERIALS

- A. Shoulder Material:

- 1. Shall be 22A aggregate as specified in MDOT (2003 Ed.) Standard Specifications, Section 902.

PART THREE - EXECUTION

3.01 CONSTRUCTION METHODS

- A. Aggregate shoulders shall be constructed as specified in MDOT (2003 Ed.) Standard Specifications, Section 307.

END OF SECTION

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SECTION 02630

STORM DRAINAGE

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes gravity-flow, non-pressure storm drainage with the following components:
 - 1. Culverts.
 - 2. Storm Sewers
 - 3. Drainage Structures

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For manholes and catch basins. Include plans, elevations, sections, details, and manhole frames and covers and catch basin frames and grates.
- C. Field quality-control test reports. Product Data: For each type of product indicated.

1.3 METHOD OF PAYMENT

- A. All work under this section is included in the contract lump sum price. No separate payments will be made for this work.

PART 2 - PRODUCTS

2.1 CULVERTS

- A. Comply with MDOT Standard Specifications for Construction, 2003 ed., Section 401.

2.2 STORM SEWERS

- A. Comply with MDOT Standard Specifications for Construction, 2003 ed., Section 402.

2.3 DRAINAGE STRUCTURES AND COVERS

- A. Comply with MDOT Standard Specifications for Construction, 2003 ed., Section 403
- B. Structure – 4' Diameter Leaching Basin

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1. Comply with MDOT Standard Plan R-1-E.
- C. Cover type – E
1. Comply with MDOT Standard Plan R-10-C.

PART 3 - EXECUTION

3.1 Culverts

- A. Comply with MDOT Standard Specifications for Construction, 2003 ed., Section 401.

3.2 Storm Sewers

- A. Comply with MDOT Standard Specifications for Construction, 2003 ed., Section 402.

3.3 Drainage Structures

- A. Comply with MDOT Standard Specifications for Construction, 2003 ed., Section 403

3.4 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred.
 1. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - c. Crushed, broken, cracked, or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Ex-filtration: Water leakage from or around piping.
 2. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
 3. Re-inspect and repeat procedure until results are satisfactory.

END OF SECTION

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SECTION 02741

HMA SURFACE

PART ONE - GENERAL

1.01 DESCRIPTION

- A. This work shall include all labor materials and equipment necessary to construct a surface of hot plant-mixed bituminous material upon an aggregate base to the lines and grades shown on the drawings and specified herein.

1.02 SUBMITTALS

- A. Comply with pertinent provisions of Division One.
- B. Contractor shall submit to the Architect/Engineer a mix design for the specified bituminous mixture for approval.

1.03 QUALITY ASSURANCE

- A. General
 - 1. The contractor shall provide suitable equipment for the paving work. Equipment shall be in good working condition and shall be operated by individuals who are properly trained and skilled for such equipment.

1.04 MEASUREMENT AND PAYMENT

- A. All work under this section is included in the contract lump sum price. No separate payments will be made for this work.

PART TWO - PRODUCTS

2.01 HMA MIXTURE

- A. HMA Mixture No. 13A shall meet the requirements of the MDOT Standard Specification 501 (2003 edition).
- B. Bituminous Mixture shall have a penetration grade of 120-150 unless otherwise shown on the plans.

PART THREE - EXECUTION

3.01 CONSTRUCTION METHODS

- A. Construction methods and equipment requirements shall be in accordance with MDOT Standard Specification 502(2003 edition).
- B. Application rates shall be as follows:
 - 1. 3" HMA
 - a. 115#/S.Y leveling course on aggregate base
 - b. 115#/s.y. surface course on leveling course

**Camp Lake # 41-4 & Muskellunge Lake # 59-10
Boating Access Site Paving**

- C. Rolling Procedures...No more than 25% of roller drum shall be allowed to extend beyond the edge of bituminous surface in order to prevent feathering and cracking of bituminous edges.
- D. Paving shall be done to a string line, if requested by the Engineer, with the Contractor required to provide the necessary string grade.

3.02 FIELD QUALITY CONTROL

- A. Testing Agency: Contractor will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing. (Cost is to be included in the base bid.)
- B. Testing agency will test HMA in place according to the Nuclear Density Method Section H (pages H-1 through H-22) of the MDOT, Density Control Handbook, or other approved method.

END OF SECTION

**Camp Lake # 41-4 & Muskellunge Lake # 59-10
Boating Access Site Paving**

SECTION 02753

CONCRETE SIDEWALK

PART ONE - GENERAL

1.01 DESCRIPTION

- A. This work shall consist of constructing a concrete sidewalk upon a prepared base at the locations shown on the plans and as specified herein.

1.02 MEASUREMENT AND PAYMENT

- A. All work under this section is included in the contract lump sum price. No separate payments will be made for this work.

PART TWO - PRODUCTS

2.01 CONCRETE CONSTRUCTION ITEMS

- A. The following items shall meet the requirements specified in the MDOT Standard Specifications for Construction (2003 Edition) as follows:
 - 1. Concrete, Grade P1.....Section 601
 - 2. Joint Filler.....Section 914
 - 3. Concrete Curing Materials.....Section 903
 - 4. Steel Reinforcement.....Section 905

PART THREE - EXECUTION

3.01 METHODS

- A. Preparing the base and construction of the concrete sidewalk shall be accomplished in accordance with MDOT Standard Specification 803 (2003 Edition).
- B. The Control joints shall be ½" x 3-1/2" deep pre-formed control joint filler and fill top with joint sealer.

END OF SECTION

**Camp Lake # 41-4 & Muskellunge Lake # 59-10
Boating Access Site Paving**

SECTION 2781

PRE-CAST CONCRETE PARKING RAILS

PART ONE - DESCRIPTION

1.01 SCOPE

- A. This work shall consist of installing 8' pre-cast concrete parking rails, both salvaged and new after completion of bituminous surfacing as shown on the plans and specified herein.

1.02 MEASUREMENT AND PAYMENT

- A. All work under this section is included in the contract lump sum price. No separate payments will be made for this work.

PART TWO - MATERIALS

2.01 PARKING RAILS.

- A. 8' pre-cast concrete parking rails stockpiled on sight.
- B. New precast concrete parking rails.

2.02 ANCHOR RODS

- A. New anchor pins shall be 18" long, steel re-rod, 5/8" diameter, furnished by Contractor.

PART THREE - EXECUTION

3.01 CONSTRUCTION METHODS

- A. Pre-cast concrete curbing shall be jointly inspected by the Contractor and the Architect/Engineer, prior to removal, to determine the condition of each piece.
- B. Parking rails damaged during the installation will be replaced by the Contractor, in kind, at no additional cost to the Owner.
- C. After surfacing, the curbing shall be placed in its final location, aligned and approved by the Architect/Engineer before anchoring. Anchor each curb with three new 18-inch steel rods furnished by the Contractor. Top of pin to be set 1/2" min. below top of concrete curb.

END OF SECTION

**Camp Lake # 41-4 & Muskellunge Lake # 59-10
Boating Access Site Paving**

SECTION 02782

PAVEMENT MARKING

PART ONE - GENERAL

1.01 DESCRIPTION

- A. This work shall consist of painting four inch wide parking stall stripes, handicapped parking symbols, text and traffic arrows at the locations shown on the plans and as specified herein.

1.02 MEASUREMENT AND PAYMENT

- A. All work under this section is included in the contract lump sum price. No separate payments will be made for this work.

PART TWO - PRODUCTS

2.01 PAINT

- A. Acrylic emulsion, white and blue, non-reflectORIZED.
- B. Approved manufacturers.
 - 1. No. 476 Zone Marking Paint by Repco Lite Paints, Inc., Holland, Michigan.
 - 2. 442XX Interior/Exterior Alkyd Traffic Marking Paint by Devoe.
 - 3. Pro-Mar Traffic Marking Paint (Alkyd) by Sherwin-Williams.
 - 4. Hydrotherm Striping by Liquid Ceramics International Ltd., Albuquerque, NM.

PART THREE - EXECUTION

3.01 METHODS

- A. Layouts for stripe alignment shall be approved by the Architect/Engineer before painting. Contractor shall notify engineer 72 hours prior to paint striping so that an inspection of the paint layout can be conducted before painting commences.
- B. Painting shall be accomplished with mechanical sprayers in accordance with paint manufacturer's printed instructions, using all means necessary to protect the painted stripes until dry.
- C. Deviation in the edges of the stripes in excess of ½ inch in 50 feet and ragged edges are not acceptable.
- D. Paint stripes which do not meet these requirements shall be **corrected** by whatever means directed by the Architect/Engineer at **no expense to the Owner**.

END OF SECTION

**Camp Lake # 41-4 & Muskellunge Lake # 59-10
Boating Access Site Paving**

SECTION 02846

SIGNAGE

PART ONE - GENERAL

1.01 DESCRIPTION

- A. Work Included: The work under this Section includes, but is not necessarily limited to, the furnishing and installation of handicap parking signs and trail warning signs as indicated on the Drawings, herein specified, and as necessary for the proper and complete performance of this work.

1.02 MEASUREMENT AND PAYMENT

- A. All work under this section is included in the contract lump sum price. No separate payments will be made for this work.

PART TWO - PRODUCTS

2.01 MATERIALS

- A. Signs:
 - 1. Reserved ADA parking Sign, 12" x 18", R7-8, as specified in the 2005 Michigan Manual on Traffic Control Devices, Part 2.
 - 2. Van Accessible sign, 6" x 12", R7-8b, as specified in the 2005 Michigan Manual on Traffic Control Devices, Part 2.
 - 3. No Parking, 12" x 18", R9-3, as specified in the 2005 Michigan Manual on Traffic Control Devices, Part 2.
 - 4. Authorized Vehicles Only Sign, 12" x 18", Red Text on White Background, same quality as specified above.
- B. Post:
 - 1. Shall be green backed enameled steel U-channel post with 3/8" holes spaced on 1" centers.
- C. Fasteners:
 - 1. Shall be 3/8" diameter oval head, zinc chromate steel carriage bolt with nut.

2.02 INSTALLATION:

- A. Bottom of Handicap parking sign shall be mounted 6'-8" above finished grade

END OF SECTION

**Camp Lake # 41-4 & Muskellunge Lake # 59-10
Boating Access Site Paving**

SECTION 02900

RESTORATION

PART ONE - GENERAL

1.01 SUMMARY

A. This Section includes the following:

1. Surface restoration and final cleanup of all items removed or damaged by the Contractor shall include, but not be limited to:
 - a. Concrete Walks or Slabs
 - b. Bituminous Surfaces
 - c. Graveled Surfaces
 - d. Lawn Areas

1.02 MEASUREMENT AND PAYMENT

A. All work under this section is included in the contract lump sum price. No separate payments will be made for this work.

PART TWO - MATERIALS

2.01 MATERIALS

- A. Seed mixture consisting of Kentucky Blue Grass - 10%, Perennial Ryegrass – 20%, Hard Fescue – 30%, Creeping Red Fescue – 40%, shall be applied at a uniform rate of 220 pounds per acre.
- B. Topsoil shall be a dark, organic, natural surface soil free of clay lumps, peat or muck, subsoil, noxious weeds or other foreign matter such as roots, sticks, rocks over 1/2 inch in diameter and not frozen or muddy. Material shall meet with the approval of the Architect/Engineer and be furnished from off state lands.
- C. Mulching Materials shall meet MDOT Standard Specification (2003) section 917.
- D. Fertilizer shall be evenly applied at a rate which will provide 240 pounds per acre of chemical fertilizer nutrients, in these proportions, **(10-0-10)**, of Nitrogen, Phosphorous and Potash. (Phosphorous free)

PART THREE - EXECUTION

3.01 CONSTRUCTION METHODS

- A. All areas disturbed by the contractor including but not limited to construction areas, stockpile areas, access roads, material and equipment storage areas shall be topsoiled and seeded.
- B. The earthen areas to receive topsoil shall be at the required grade and properly trimmed. Topsoil shall be spread on the prepared areas to a depth of not less than 3". After spreading, any large clods and lumps of topsoil shall be broken up and pulverized. Stones and rocks over 1" in diameter, roots, litter, and all other foreign matter shall be raked up and disposed of by the contractor. Place topsoil only when it can be followed within a reasonable time by seeding operations.

**Camp Lake # 41-4 & Muskellunge Lake # 59-10
Boating Access Site Paving**

- C. For areas to be seeded, chemical fertilizer shall be evenly applied on the prepared topsoil surface at a rate which will provide 240 pounds per acre of chemical fertilizer nutrients, in equal proportions of Nitrogen, and Potash, or as directed by the Architect/Engineer.
- D. Fertilizer spread by drill or broadcast methods will be placed or worked into the soil to a depth of one to two inches.
- E. The seed shall be sown by broadcast method following the application of the fertilizer and while the seed bed is in a friable condition. The seeding shall be floated and lightly compacted to incorporate the seed into the uppermost one-half inch of the soil.
- F. Mulch shall consist of straw and shall be spread over the surface to a uniform thickness to allow sunlight to penetrate and air to slowly circulate, but thick enough to shade the ground, reduce rate of water evaporation, and prevent or reduce water or wind erosion. Straw mulch shall be anchored by crimping in place. Erosion control blankets shall be installed on all slopes which are 3 horizontal to 1 vertical or steeper.
- G. Concrete Walks or Slabs - Shall be cut at contraction or expansion joints and replaced with air-entrained, 3500 psi concrete, meeting MDOT Grade 35S of the same thickness and finish as that which was removed.
- H. Bituminous Surfaces - Shall be cut back to straight-line joints. Replace with a 6" layer of compacted MDOT 22-A aggregate and a 2" layer of MDOT No. 1100-T Bituminous Mixture

END OF SECTION

**Camp Lake # 41-4 & Muskellunge Lake # 59-10
Boating Access Site Paving**

DIVISION SIX - WOOD AND PLASTIC

SECTION 06100

TIMBER STRUCTURES

PART ONE - GENERAL

1.01 DESCRIPTION

- A. The work covered in this Section shall include the furnishing of all labor, materials, plant, equipment and appliances required to complete wood framing work, including installation of lumber items, as specified, complete, in strict accordance with this Section of the Specification, the Drawings, and the referenced standards.

Pressure Treated Wood shall include all exposed lumber and timbers and as designated on the drawings. Pressure treatment shall be as specified herein.

The Work Under this Section includes, but is not necessarily limited to the following:

1. Boardwalk

1.02 STORAGE AND PROTECTION

- A. Stack lumber and sheeting materials to insure proper ventilation and drainage. Protect lumber and sheeting materials from the elements by storing indoors or on raised platforms and covered with canvas or plastic film
- B. Use all means necessary to protect installed work.

1.03 REFERENCE STANDARDS

- A. Douglas Fir-Larch: Western Wood Products Association (WWPA).
- B. Hemlock: West Coast Lumber Inspection Bureau (WCLIB).
- C. Southern Pine: Southern Pine Inspection Bureau (SPIB).
- D. Soft Plywood: PSI-74 and American Wood Preservers Association (AWPA).
- E. Pressure Treated Wood: American Wood Preservers Association (AWPA).
- F. Rough Hardware: National Forest Products Association (NFPA).

1.04 SEASONING

- A. Lumber shall be kiln-dried and well seasoned, not to contain more than 15% moisture.

**Camp Lake # 41-4 & Muskellunge Lake # 59-10
Boating Access Site Paving**

1.05 SUBMITTALS

- A. Furnish a certificate stating that products installed on this project comply with these specification requirements. The certificate shall indicate chemical used and retention obtained.

1.06 GRADE MARKS

- A. Lumber and sheeting materials shall be identified by official grade marks.

PART TWO - PRODUCTS

2.01 DRESSING

- A. 2" x dimension lumber shall be S4S unless otherwise noted.
- B. All other lumber may be rough sawn.

2.02 MATERIALS

- A. Framing Members: Framing members shall be Douglas Fir-Larch, No.2 or better; Hemlock-Fir, No.1 or better; Southern Pine, No. 2 or better.
- B. Where framing lumber from 2" through 4" thick and 4" or less wide is shown, provide lumber complying with the specified requirements for dimension lumber and with the following grading, unless otherwise indicated: Construction Grade, light framing mark "Const", Fb. 1,200 psi.
- C. When framing lumber 6" and wider, and from 2" through 4" thick is shown, provide lumber complying with the specified requirements for dimension lumber and with the following:
 - 1. Species and Grade: No. 2 grade (structural joist and planks) Douglas Fir (WCLB or WWPA) or Southern Pine (SPIB)
 - 2. Extreme fiber stress in bending: Fb = 1,200 psi
 - 3. Modulus of elasticity: E = 1,000,000 psi
- D. Posts and columns: 6" X 6" and 8" X 8", provide lumber complying with the specified requirement for dimension lumber and with the following:
 - 1. Species and grade: Dense Douglas Fir-Larch, Grade: Dense Sel. Struc.
 - 2. Compression parallel to grain: Fc = 1,350 psi
 - 3. Extreme fiber stress in bending: Fb = 1,750 psi
 - 4. Modulus of elasticity: E = 1,700,000 psi

**Camp Lake # 41-4 & Muskellunge Lake # 59-10
Boating Access Site Paving**

- E. Rough Hardware: Rough hardware shall include all types and sizes of nails, screws, washers, anchors, clips and other fasteners and connectors required to properly secure wood members, shall be manufactured by Simpson Strong-Tie Company, or approved equal. All hardware shall have rust resistant plating/galvanizing or be Stainless Steel and be approved by the engineer.
- F. Preservative Treatment: The requirements for the conditioning and pressure treatment of posts and for the retention and penetration of the preservative shall be in accordance with Table 1, Soil or Ground Contact, of ASTM D1760. The requirements for species not listed in Table #1 of ASTM D1760, shall be the same as the requirements specified for Jack Pine. Preservative used shall be (ACC), (ACA), (CCA), (CZC), or (FCAP). All ends cut across grain after treatment are to be field coated with preservative.

2.03 MISCELLANEOUS MATERIALS

- A. Miscellaneous carpentry materials require for a complete and proper installation shall be new and suitable for intended use.

PART THREE - EXECUTION

3.01 SURFACES

- A. Prior to beginning work, inspect the installed work of other trades and verify that such work is complete to the point that carpentry work may properly commence

3.02 CONSTRUCTION

- A. Carpentry construction shall conform to good trade practice, building codes and regulations.

3.03 WORKMANSHIP

- A. Joints shall be true, tight and well nailed.
- B. Contractor shall inspect individual pieces so that knots and defects will not interfere with placing bolts or nailing.
- C. Install wood framing as shown or noted on the drawings. Framing shall be erected true to line, levels and dimensions, squared, aligned, plumbed and adequately blocked and braced. All members shall be securely nailed or bolted to serve the purpose intended. Provide framing to suit the work of other trades, install plates, nailers and blocking as detailed or required to complete work.
- D. Do not allow the installation of damaged or non-complying material.

3.04 Posts and Columns

- A. Posts shall be placed by setting post in position shown on the plans. The posts shall be set plumb, and the trench shall be backfilled with earth fill and compacted as indicated on the plans in such a way as not to displace the posts.

**Camp Lake # 41-4 & Muskellunge Lake # 59-10
Boating Access Site Paving**

- B. Concrete: The maximum allowable time interval between introduction of the mixing water and placement of the concrete in the work shall be one hour, except that when approved retardant is used, this time shall not exceed three hours.
- C. Cuts and abrasions in preservative-treated post and blocks shall have newly exposed surfaces treated with at least two brush coats of the preservative used for treating posts as directed by the Architect/Engineer.

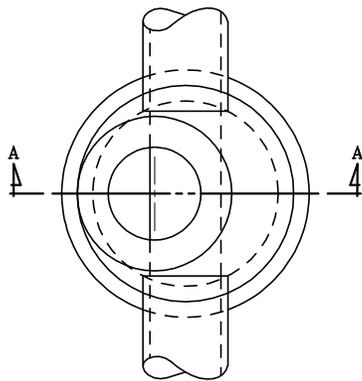
3.05 FASTENING

- A. Nail without splitting wood. Replace any split members. Provide penetration piece receiving point of not less than 1/2 the length of the nail or spike.
- B. Drill holes 1/16 inch larger than diameter of any bolt being used. Drill straight and true from one side only. Use washers under all nuts and under bolt heads bearing on wood.

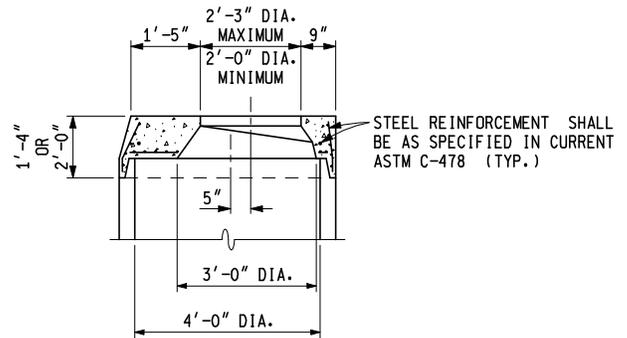
3.06 CLEAN UP

- A. Keep premises in an orderly condition, free from accumulation of sawdust, cut ends and debris.

END OF SECTION

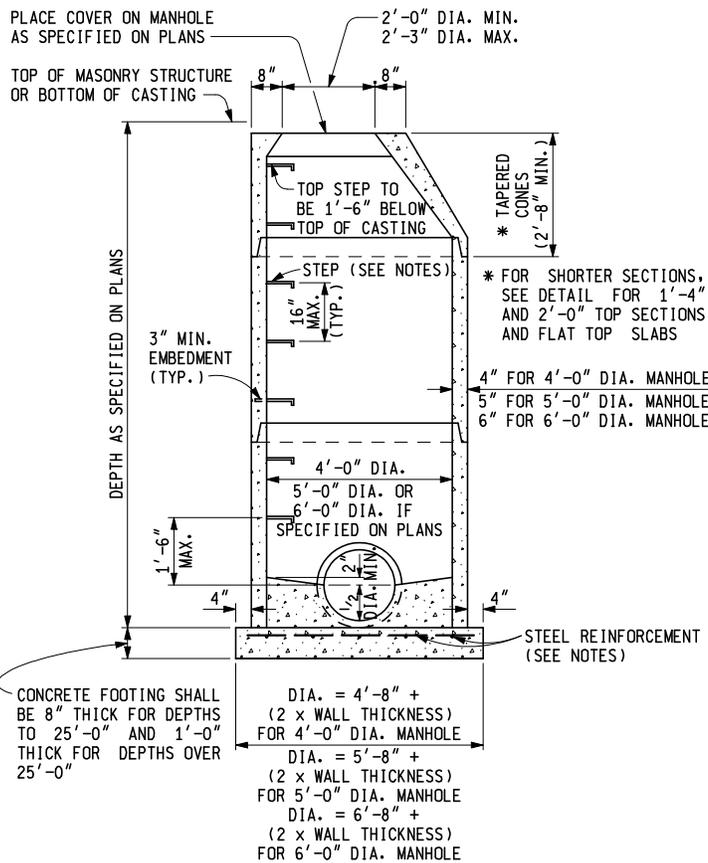


PLAN VIEW



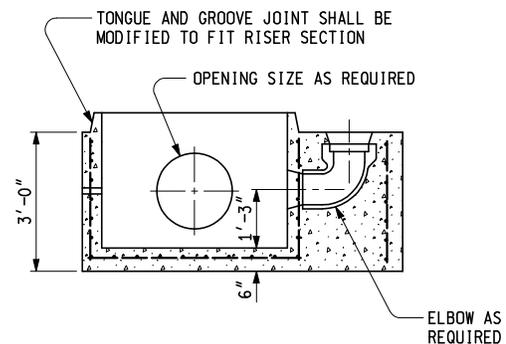
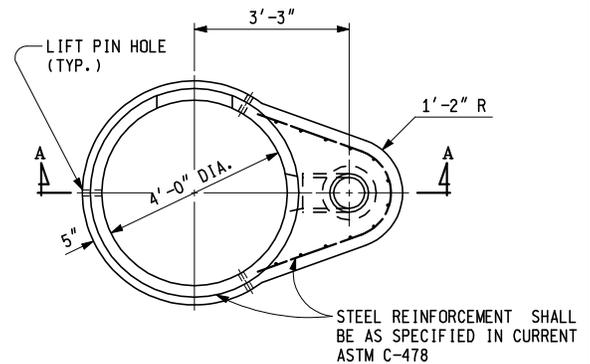
DETAIL FOR
1'-4" & 2'-0" TOP SECTIONS

SHAPE MAY VARY FROM DETAIL SHOWN BUT MUST COMPLY WITH ASTM C-478 AND JOINTS SHALL BE COMPATIBLE WITH THE RISER



SECTION A - A
TYPICAL MANHOLE

PRECAST REINFORCED CONCRETE SHOWN
OTHER OPTIONS INCLUDE CONCRETE BLOCK, BRICK, OR CAST-IN-PLACE WALL SECTIONS
SEE TYPICAL WALL SECTIONS FOR WALL THICKNESS



SECTION A - A

TYPICAL PRECAST REINFORCED
BOTTOM SECTION FOR DROP MANHOLE



DEPARTMENT DIRECTOR
Kirk T. Stuedle

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

PREPARED BY
DESIGN DIVISION

APPROVED BY: _____
ENGINEER OF DELIVERY

DRAINAGE STRUCTURES

DRAWN BY: B.L.T.
CHECKED BY: W.K.P.

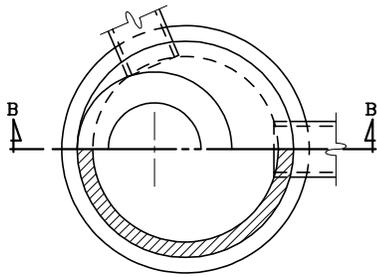
APPROVED BY: _____
ENGINEER OF DEVELOPMENT

F.H.W.A. APPROVAL

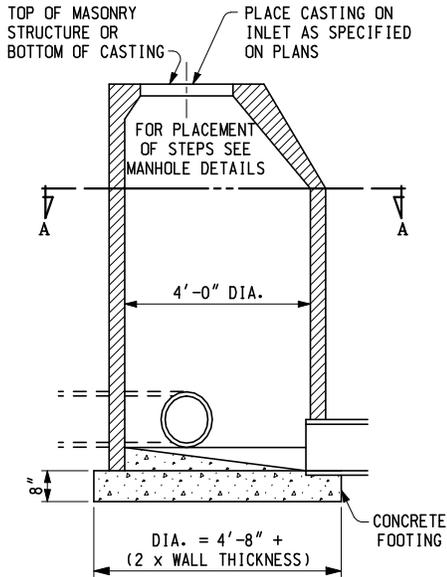
16-2009
PLAN DATE

R-1-E

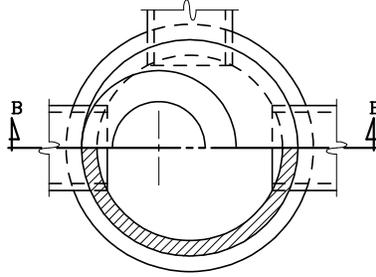
SHEET
1 OF 5



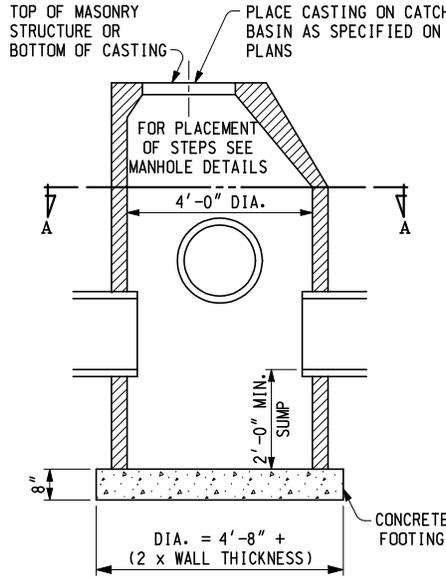
HALF SECTION A - A



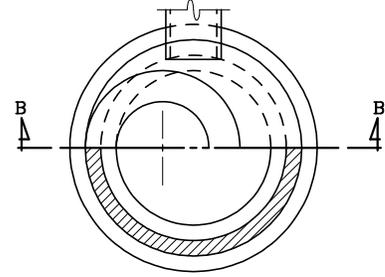
SECTION B - B
INLET



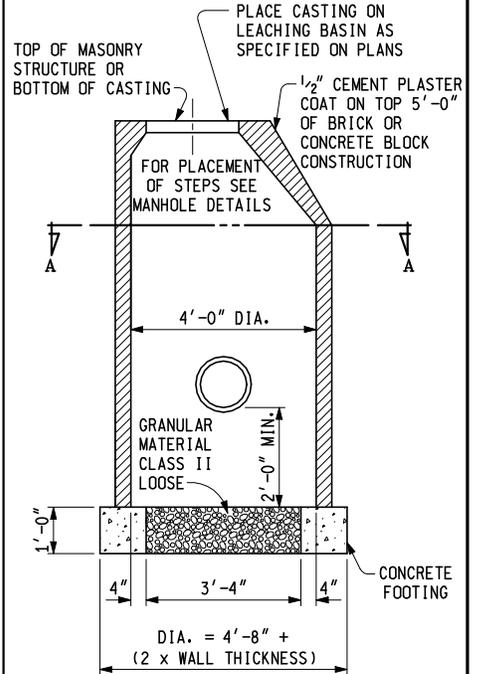
HALF SECTION A - A



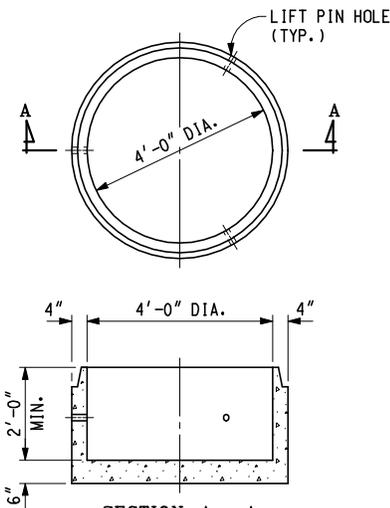
SECTION B - B
CATCH BASIN



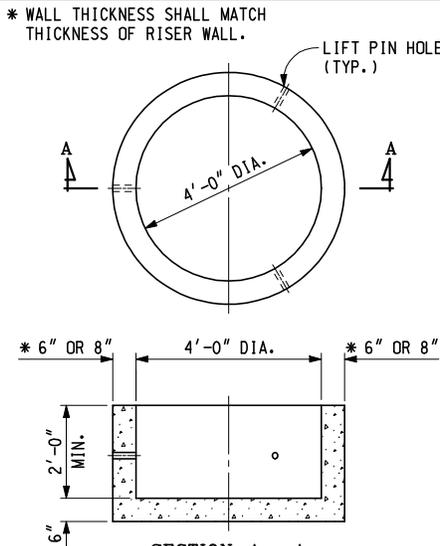
HALF SECTION A - A



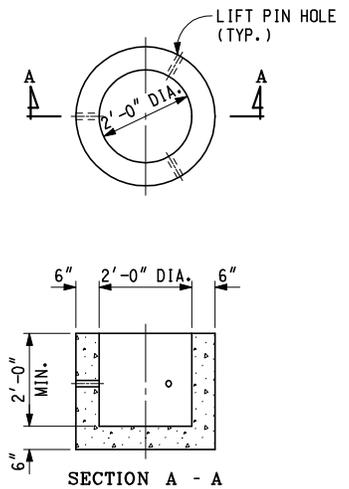
SECTION B - B
LEACHING BASIN



SECTION A - A
PRECAST SUMP
FOR PRECAST RISERS



SECTION A - A
PRECAST SUMP FOR BRICK
OR BLOCK CONSTRUCTION



SECTION A - A
PRECAST SUMP FOR
2'-0" DIA. STRUCTURES

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

DRAINAGE STRUCTURES

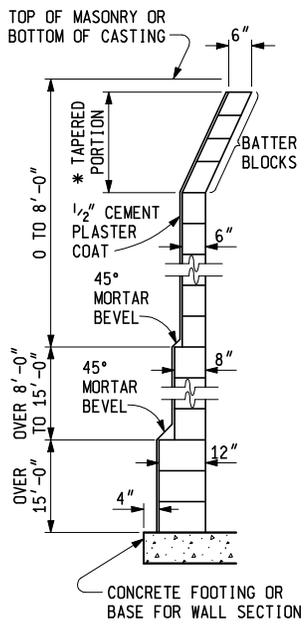
F.H.W.A. APPROVAL

4-16-2009
PLAN DATE

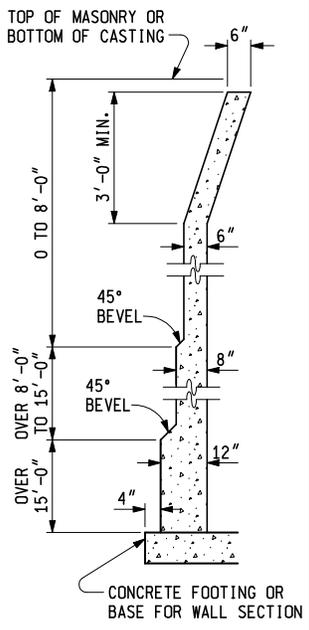
R-1-E

SHEET
2 OF 5

* 4 BLOCK MIN. FOR 4'-0" DIA. STRUCTURE
 6 BLOCK MIN. FOR 5'-0" DIA. STRUCTURE
 6 BLOCK MIN. FOR 6'-0" DIA. STRUCTURE

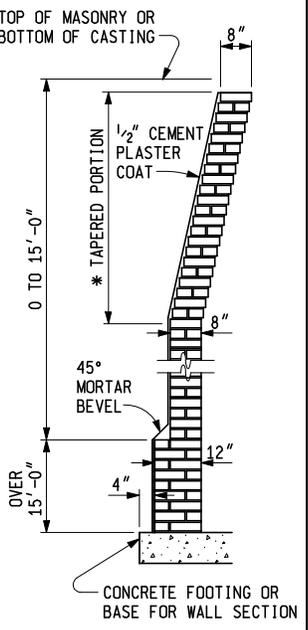


TYPICAL CONCRETE BLOCK WALL SECTION

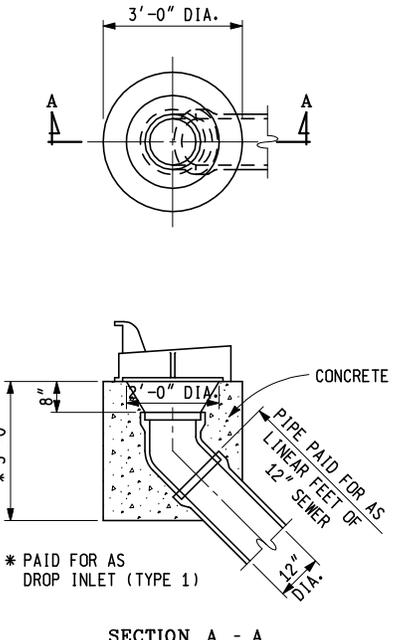


TYPICAL CAST-IN-PLACE CONCRETE WALL SECTION

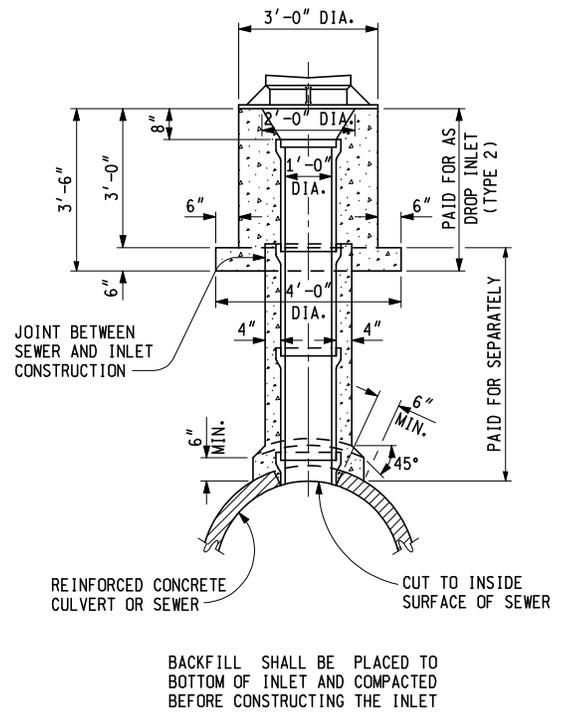
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 6'-0" MIN. FOR 5'-0" DIA. STRUCTURE
 6'-0" MIN. FOR 6'-0" DIA. STRUCTURE



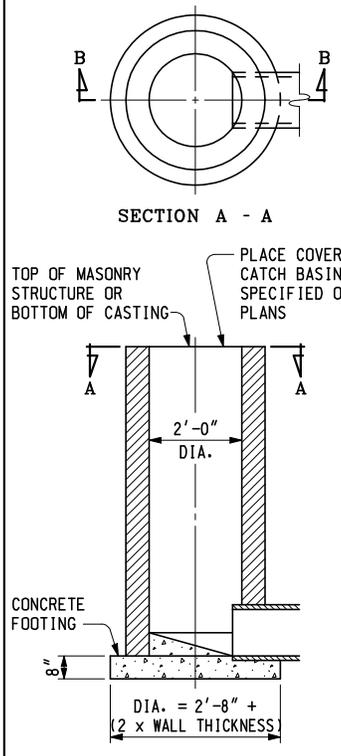
TYPICAL BRICK WALL SECTION



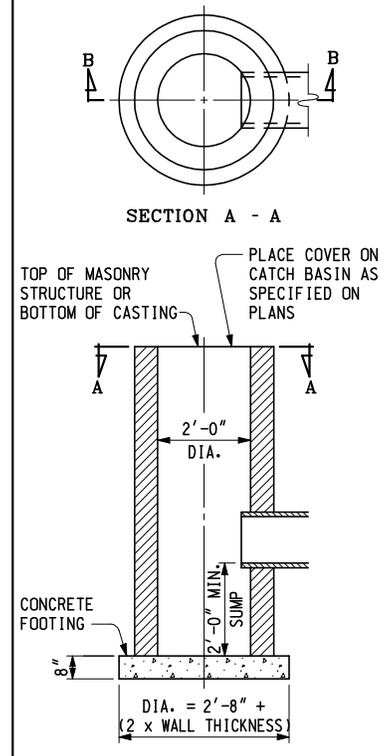
SECTION A - A
 DROP INLET (TYPE 1)



DROP INLET (TYPE 2)



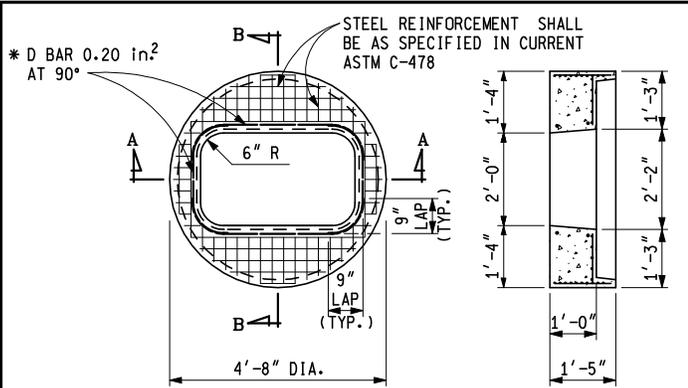
INLET



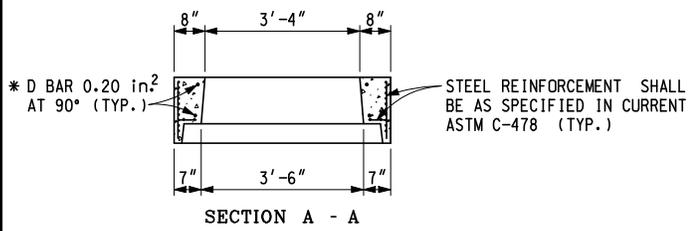
CATCH BASIN

MICHIGAN DEPARTMENT OF TRANSPORTATION
 BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

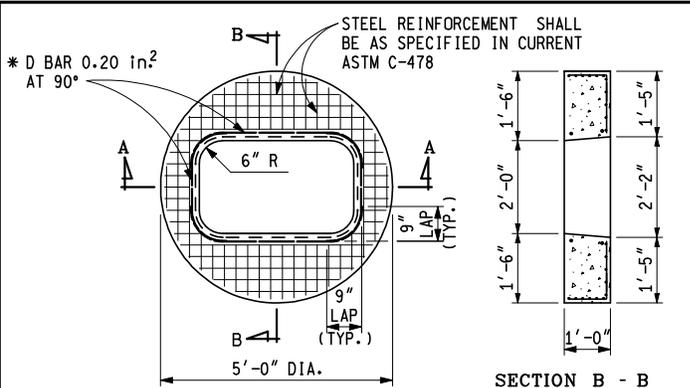
DRAINAGE STRUCTURES



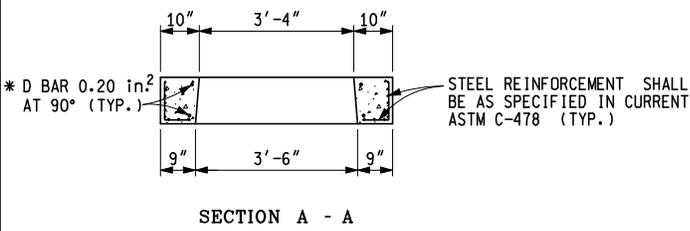
* D BARS MAY BE BENT AT A SMALLER RADIUS RATHER THAN PARALLELING THE RADIUS IN THE DRAIN OPENING



PRECAST FLAT SLAB TOP FOR PRECAST CONCRETE STRUCTURE, 2' x 4' CASTING



* D BARS MAY BE BENT AT A SMALLER RADIUS RATHER THAN PARALLELING THE RADIUS IN THE DRAIN OPENING



PRECAST FLAT SLAB TOP FOR MASONRY STRUCTURE, 2' x 4' CASTING

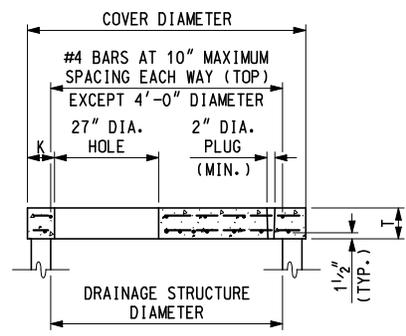
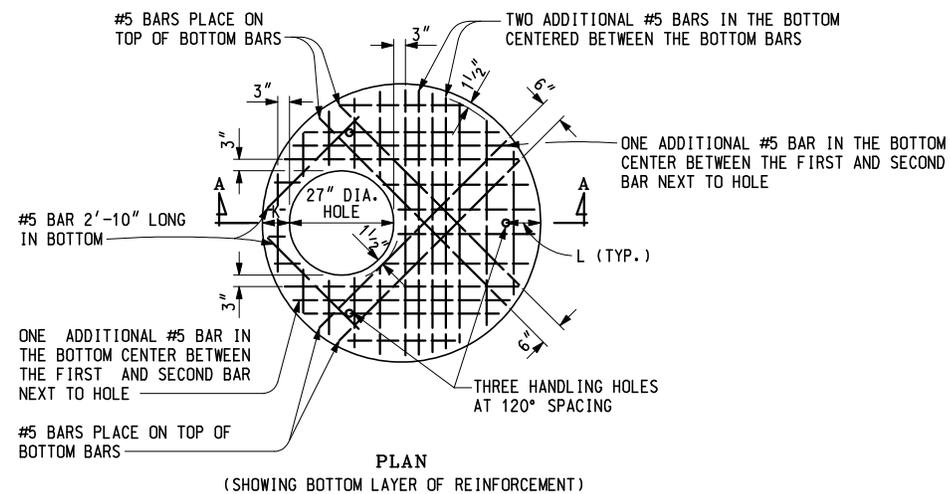


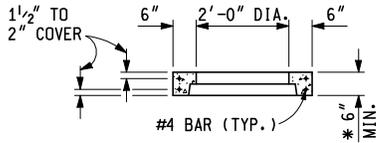
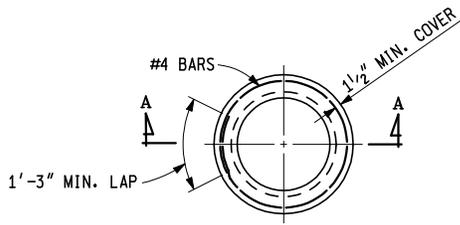
TABLE OF DIMENSIONS					
STRUCTURE DIAMETER	COVER DIAMETER	T	K	L	#5 BAR MAXIMUM SPACING (BOTTOM EACH WAY)
* 4'-0"	58"	6"	6"	8"	6"
5'-0"	72"	8"	7"	9"	7"
6'-0"	86"	8"	8"	10"	6"

* ONLY BOTTOM LAYERS OF STEEL NECESSARY

PRECAST REINFORCED CONCRETE FLAT SLAB TOP

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

DRAINAGE STRUCTURES



SECTION A - A

* WHEN RISER TONGUE LENGTH IS GREATER THAN 3", USE 2 TIMES THE TONGUE LENGTH.

NOTE: PRECAST RISER SHALL FULLY ENGAGE THE TONGUE OF THE RISER PIPE.

PRECAST RISER RING
(FOR 2'-0" DIAMETER STRUCTURE)

NOTES:

THE DRAINAGE STRUCTURE COVERS ALLOWED FOR USE ON THESE DRAINAGE STRUCTURES ARE SPECIFIED IN SUBSEQUENT STANDARD PLANS AND ARE INTERCHANGEABLE ON ANY STRUCTURE.

THE TOPS OF MASONRY STRUCTURES SHALL BE SUFFICIENTLY LOW TO PERMIT PROPER ADJUSTMENT OF COVER TO GRADE USING MORTAR OR BRICK AS DIRECTED BY THE ENGINEER.

PREMIUM JOINTS ARE REQUIRED ON ALL SANITARY MANHOLES. SEE ASTM DESIGNATION C-923.

GRANULAR MATERIAL CLASS III SHALL BE USED IN BACKFILLING AROUND ALL STRUCTURES THAT FALL WITHIN THE 1:1 INFLUENCE LINES FROM THE EDGE OF PAVEMENT OR BACK OF CURB.

A STRIP OF SOD 3'-0" WIDE SHALL BE PLACED AROUND THE TOP OF EACH STRUCTURE LYING OUTSIDE THE SURFACED PORTIONS OF THE HIGHWAY.

STEPS FOR DRAINAGE STRUCTURES SHALL BE OF AN APPROVED DESIGN AND MADE FROM CAST IRON, ALUMINUM, OR PLASTIC COATED STEEL. RUNGS SHALL BE A MINIMUM OF 10" IN CLEAR LENGTH, DESIGNED TO PREVENT THE FOOT FROM SLIPPING OFF THE END. THE MINIMUM HORIZONTAL PULL OUT LOAD SHALL BE 400 LBS. THE MINIMUM VERTICAL LOAD SHALL BE 800 LBS.

THE BELL SHALL BE REMOVED FOR THE FIRST LENGTH OF OUTLET PIPE PROJECTING THROUGH THE WALL OF THE MANHOLE.

PRECAST CONCRETE SECTIONS, SUMPS, AND FLAT TOP SLABS SHALL BE BUILT ACCORDING TO ASTM C-478 AND ACCORDING TO DETAILS SPECIFIED ON THIS PLAN. PRECAST REINFORCED CONCRETE FLAT TOP SLAB SHALL BE MARKED TO SHOW LOCATION OF REINFORCEMENT. THE WALLS OF THE PRECAST UNITS MAY HAVE A SLIGHT TAPER TO ALLOW FOR FORM REMOVAL. PRECAST CONCRETE 2'-0" DIAMETER DRAINAGE STRUCTURES SHALL HAVE A MINIMUM 3" WALL THICKNESS WITH A 6" MINIMUM BEARING SURFACE ON TOP. SEE PRECAST RISER RING FOR 2'-0" DIAMETER STRUCTURE.

PIPES ENTERING OR LEAVING PRECAST STRUCTURES SHALL NOT HAVE AN INSIDE DIAMETER GREATER THAN 2'-0" LESS THAN THE INSIDE DIAMETER OF THE STRUCTURE, EXCEPT THAT A PIPE LEAVING A 2'-0" INSIDE DIAMETER STRUCTURE MAY HAVE A 1'-0" INSIDE DIAMETER OR LESS.

THE NUMBER OF PIPE OPENINGS IN A RISER SHALL BE DETERMINED BY THE DESIGNER. SPACING BETWEEN OPENINGS SHALL BE 6" MINIMUM. OPENINGS MAY BE CONSTRUCTED BY CASTING, REMOVING THE GREEN CONCRETE, OR BY DRILLING THE OPENINGS IN CURED CONCRETE.

WHEN A SEWER TRAP IS CALLED FOR ON THE PLANS, IT SHALL BE PLACED IN THE OUTLET SEWER LINE OF CATCH BASINS AND CONSTRUCTED ACCORDING TO STANDARD PLAN R-19-SERIES. SEWER TRAPS SHALL BE PAID FOR SEPARATELY AT THE CONTRACT UNIT PRICE, EACH.

PRECAST CONCRETE FOOTINGS OR BASES SHALL BE REINFORCED WITH #4 BARS SPACED AT 1'-0" BOTH WAYS OR WITH TWO LAYERS OF WELDED WIRE FABRIC OF EQUIVALENT CROSS SECTIONAL AREA LAID AT RIGHT ANGLES AND WIRED TOGETHER. REINFORCEMENT SHALL BE PLACED IN TOP OF FOOTING AND SHALL BE MARKED. STEEL REINFORCEMENT MAY BE OMITTED IN CAST-IN-PLACE CONCRETE FOOTINGS.

PRECAST CONCRETE FOOTINGS SHALL BE SUPPORTED BY A COMPACTED 6" GRANULAR SUBBASE.

THE MINIMUM WALL THICKNESS FOR ALL 2'-0", 4'-0", 5'-0", AND 6'-0" DRAINAGE STRUCTURES USING CONCRETE BLOCK, BRICK, OR CAST-IN-PLACE CONCRETE SHALL BE AS SPECIFIED IN TYPICAL WALL SECTIONS.

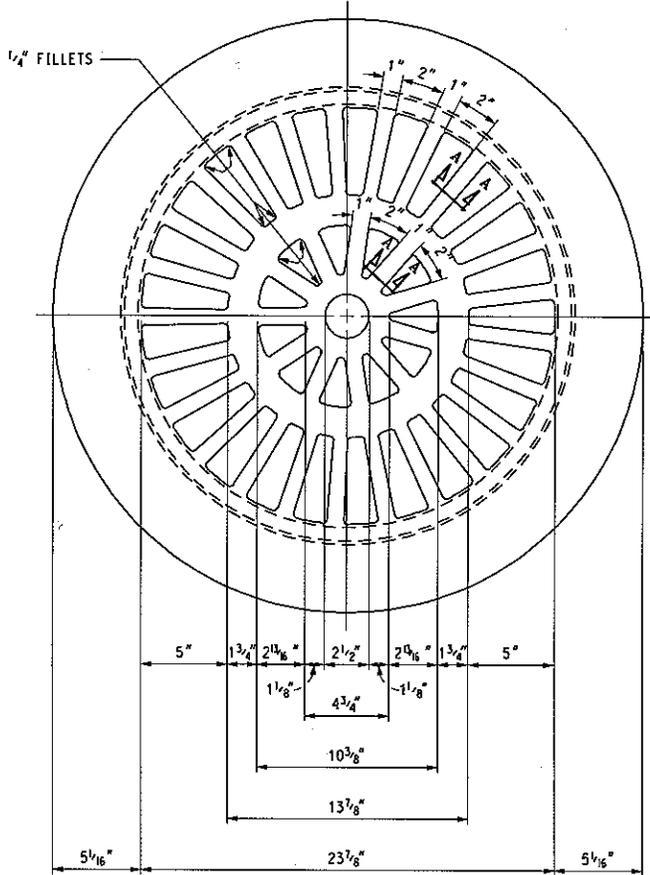
THE CONICAL SECTION OF MANHOLES OR CATCH BASINS CONSTRUCTED OF BLOCK OR BRICK SHALL BE SHROUDED WITH GEOTEXTILE FABRIC TO A MINIMUM DEPTH OF 5'-0" OR THROUGH THE FROST ZONE. ENOUGH GEOTEXTILE MATERIAL SHALL BE LEFT ON THE TOP (8' OR MORE) TO ROLL OVER THE TOP OF THE CONE.

PREFORMED HIGH DENSITY POLYSTYRENE FILLER PIECES MAY BE USED TO CHANNEL FLOW IN THE BOTTOM OF MANHOLES PROVIDED THEY HAVE AT LEAST 2" OF CONCRETE COVER. THE USE OF THIS MATERIAL FOR CHANNEL FLOW IS RESTRICTED TO MANHOLES WHERE THE BOTTOM SECTION IS NOT SUBJECT TO FREEZING. THE USE OF THIS MATERIAL MUST BE APPROVED BY THE ENGINEER.

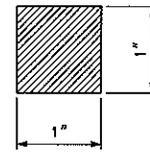
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

DRAINAGE STRUCTURES

F.H.W.A. APPROVAL	4-16-2009 PLAN DATE	R-1-E	SHEET 5 OF 5
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PLAN VIEW



SECTION A - A

NOTES:

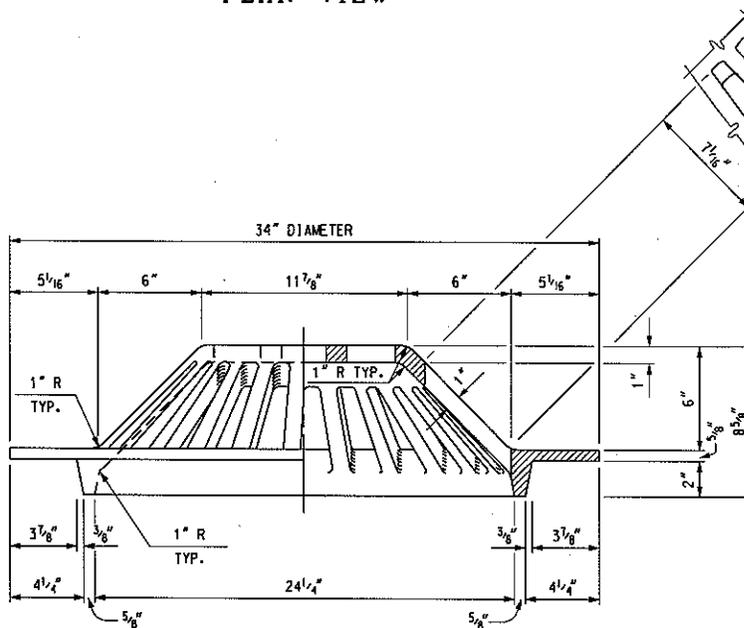
THE CASTINGS SHALL MEET THE REQUIREMENTS OF THE CURRENT STANDARD SPECIFICATION FOR GRAY IRON CASTINGS.

ALL CASTINGS SHALL BE CLEANED BY CURRENT APPROVED BLASTING METHODS.

THE CASTINGS SHALL BE FREE OF POURING FAULTS, BLOW HOLES, CRACKS AND OTHER IMPERFECTIONS. THEY SHALL BE SOUND, TRUE TO FORM AND THICKNESS, CLEAN AND NEATLY FINISHED, AND SHALL BE COATED WITH COAL TAR PITCH VARNISH.

THE CASTING SHALL BE SET IN SOFT MORTAR BED TO THE ELEVATION SPECIFIED ON THE PLANS AND IN SUCH A MANNER AS TO PROVIDE A FIRM AND UNIFORM BEARING ON THE MASONRY WALL.

THIS COVER IS DESIGNED TO FIT ON ANY INLET, CATCH BASIN OR ON ANY EXISTING SIMILAR STRUCTURE WHEN SO DESIGNATED ON THE PLANS.



HALF ELEVATION

HALF SECTION

NORMAL VIEW OF INCLINED RIB



ENGINEER OF CONSTRUCTION & TECHNOLOGY

PREPARED BY
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MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

COVER E

FOR USE ON STRUCTURES IN DITCHES
WHERE NOT SUBJECT TO TRAFFIC

10-27-2004
F.H.W.A. APPROVAL

5-26-2004
PLAN DATE

R-10-C

SHEET
1 OF 1

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