

CHAPTER 2

POLICY AND PROCEDURES



Note: For trunkline projects, direct questions and comments to the Hydraulic Unit Supervisor, Environmental Services Section.

Revised September 2026

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If you require assistance accessing this information or require it in an alternative format, contact the Michigan Department of Transportation's (MDOT) Americans with disabilities Act (ADA) coordinator at Michigan.gov/MDOT-ADA.

2.1 INTRODUCTION

This chapter summarizes applicable legislation and policies for highway drainage design in the State of Michigan and is intended only as a high-level reference. The design professional must confirm all references are current and applicable at the time of design. For more detailed information regarding drainage laws, consult with a qualified attorney. Additionally, this chapter applies primarily to MDOT trunkline projects. For local agency projects, specific policies should be reviewed and determined by the applicable local agency.

2.2 DEFINITIONS

County Drain - Michigan's Drain Code, MCL 280.3, provides that a drain "...shall include the main stream or trunk and all tributaries or branches of any creek or river, any watercourse or ditch, either open or closed, any covered drain, any sanitary or any combined sanitary and storm sewer, or storm sewer or conduit composed of tile, brick, concrete or other material, any structures or mechanical devices, ...pumping equipment...any levee, dike, barrier, or a combination of any or all of the same ...for the purpose of drainage..." Therefore, a "county drain" or "intercounty drain" can be a natural or artificially constructed water conveyance system, provided it was legally established pursuant to the Michigan Drain Code (MCL 280) and falls under the jurisdiction of the County Drain office.

Dam - An artificial barrier, including dikes, embankments, and appurtenant works, that impounds, diverts, or is designed to impound or divert water or a combination of water and any other liquid or material in the water; that is or will be when complete 6 feet or more in height; and that has or will have an impounding capacity at design flood elevation of 5 surface acres or more. Dam does not include a storage or processing tank or standpipe constructed of steel or concrete, a roadway embankment not designed to impound water, or a dug pond where there is no impoundment of water or waste materials containing water at levels above adjacent natural grade levels. MCL 324.31502

Drainage Course - Any conveyance other than the defined "inland lake and stream." This is the natural flow of water over land as caused by the topography.

Easement - Specific rights of use from a landowner. MDOT secures its right-of-way (ROW) either by easement, statutory (law), or fee (purchase). County drain ROW is normally obtained by permanent easement.

Floodplain - Per State of Michigan floodplain rules, an area of land adjoining a river or stream that will be inundated by a 1% Annual Exceedance Probability (AEP) (100-year) flood. MCL 324.3103, R 323.1311e

Floodwaters - Waters that have escaped from a watercourse (and its overflow channels) or, due to the intensity of rainfall, waters that cannot enter a watercourse. These waters then flow or stand over adjoining lands. They remain floodwaters until they disappear from the surface by infiltration or evaporation or return to a natural watercourse.

Floodway - The channel of a river or stream and those parts of the floodplain adjoining the channel that are reasonably required to carry and discharge a 1% AEP (100-year) flood. MCL 324.3103, R 323.1311

Groundwaters -Groundwaters are divided into two classes: percolating waters and underground streams. Percolating waters generally include all waters that pass through the ground beneath the surface of the earth without a definite channel. The general rule is that all underground waters are presumed to be percolating. To take them out of the

percolating class, the existence and course of a permanent channel must be clearly shown. Underground streams are waters passing through the ground beneath the surface in permanent, distinct, and well-defined channels.

Harmful Interference - Causing an increased stage or change in direction of flow of a river or stream that causes, or is likely to cause, any of the following: i) Damage to property, ii) A threat to life, iii) A threat of personal injury, iv) Pollution, impairment, or destruction of water or other natural resources. MCL 324.3103, R 323.1311g

Hydraulic Engineer – An engineer who has a working knowledge of state drainage laws, environmental rules and regulations, and permit requirements including an understanding of the rights and responsibilities of both the DOT and adjacent property owners.

Inland Lake or Stream - (i) An artificial or natural lake, pond, or impoundment that is a water of the United States as that term is used in section 502(7) of the federal water pollution control act, 33 USC 1362 (ii) A natural or artificial lake, pond, or impoundment; a river, stream, or creek which may or may not be serving as a drain as defined by the Michigan Drain Code of 1956, 1956 PA 40, MCL 280.1 to 280.630; or any other body of water that has definite banks, a bed, and visible evidence of a continued flow or continued occurrence of water, including the St. Marys, St. Clair, and Detroit Rivers. Inland lake or stream does not include the Great Lakes, Lake St. Clair, or a lake or pond that has a surface area of less than 5 acres. MCL 324.30101

Intercounty Drain - Legally established drain whose drainage district is comprised of lands in multiple counties. Intercounty drains are managed by a Drainage Board chaired by the Michigan Department of Agriculture and Rural Development.

Ordinary High Water Mark (OHWM) - The line between upland and bottomland that persists through successive changes in water levels, below which the presence and action of the water is so common or recurrent that the character of the land is marked distinctly from the upland and is apparent in the soil itself, the configuration of the surface of the soil, and the vegetation. On an inland lake that has a level established by law, it means the high established level. Where water returns to its natural level as the result of the permanent removal or abandonment of a dam, it means the natural ordinary high water mark. MCL 324.30101. On Great Lakes, the ordinary high water mark is published in [Section 32502](#) of Part 325 of Natural Resources and Environmental Protection Act (NREPA).

Pre-project - The last land use prior to the planned new development or redevelopment (the existing conditions).

Post-development or Post-Construction - The land use including the planned new development or redevelopment.

River - A flowing body of water or a portion or tributary of a flowing body of water, including streams, creeks, or impoundments and small lakes thereon. MCL 324.30501

Stormwater - The runoff generated when precipitation from rain and snowmelt events flows over land or impervious surfaces without percolating into the ground.

Surface Waters - Stormwater or groundwater that runs off or otherwise flows onto the land surface, including lakes, ponds, rivers, and streams. In some instances, wetlands may also be classified as surface waters.

Waters of the State - Groundwaters, lakes, rivers, and streams and all other watercourses and waters, including the Great Lakes, within the jurisdiction of this state. MCL 324.3101

Wetland - As defined in Part 303 of the NREPA (Public Act 451 of 1994), a wetland means a land or water feature, commonly referred to as a bog, swamp, or marsh, inundated or saturated by water at a frequency and duration sufficient to support, and that under normal circumstances does support, hydric soils and a predominance of wetland vegetation or aquatic life. A land or water feature is not a wetland unless it meets any of the following:

- Is a water of the United States as that term is used in section 502(7) of the federal water pollution control act, 33 USC 1362.
- Is contiguous to the Great Lakes, Lake St. Clair, an inland lake or pond, or a stream. As used in this subparagraph, "pond" does not include a farm or stock pond constructed consistent with the exemption under section 30305(2)(g).
- Is more than 5 acres in size.
- Has the documented presence of an endangered or threatened species under part 365 or the endangered species act of 1973, Public Law 93-205.
- Is a rare and imperiled wetland.

Symbols and acronyms used in this chapter are listed in **Appendix 2-A**.

2.3 RESPONSIBILITY OF HYDRAULIC ENGINEER/PROJECT MANAGER IN LEGAL MATTERS

The Hydraulic Engineer or Project Manager has a two-fold responsibility for the legal aspects of highway drainage. First, know the legal principles involved and apply this knowledge to the design.

Second, work closely with the legal staff of the State of Michigan or the local agency, as necessary, to resolve drainage cases. The Hydraulic Engineer has direct legal involvement in the following areas:

- Conduct investigations, advise, and provide expert testimony on the technical aspects of drainage claims involving existing highways.
- Provide drainage design information during ROW acquisition to assist appraisers in evaluating damages, and provide testimony in subsequent condemnation proceedings, when necessary.
- When an issue under MDOT jurisdiction is known to exist within the scope of work that has led to backups or is likely to cause backups, design the project to correct the known issue.

2.4 HYDRAULIC POLICY AND PROCEDURES

MDOT policy and guidelines are outlined in various instruments such as Assistant Attorney General memos, Attorney General Opinions, State Executive Order, legislation, memos, and correspondence with other public agencies and counsel. Design guidelines provided in this manual and other design manuals are the standards by which a policy is carried out or placed in action.

When the line and grade of new roadways, or the extent and limits of a widening or reconstruction project are determined, a careful engineering study and design are required concurrently for surface and subsurface drainage. Highway drainage design involves three basic operations: estimate peak flows of runoff, design a conveyance system, and design water quality and channel protection measures for the conveyance system that meet the required environmental permit constraints.

Planning, design, and construction of highway facilities are required to ensure compliance with all federal, state, and applicable local agency laws, regulations, and permitting requirements. This includes the following sources of federal law:

- The Constitution of the United States
- Acts of Congress and agency regulations issued to implement these Acts
- Federal Case Law

State laws that require compliance include:

- State Constitution
- State Legislative Laws, including the Michigan Drain Code (Public Act 40 of 1956)
- State Case Law

Compliance with local agency drainage ordinances and permitting is not required for state or federal projects, but MDOT requires that the intent of all local drainage ordinances be considered and complied with as much as is economically and reasonably possible.

2.4.1 ROW for Drainage

Types of ROW and considerations for drainage are discussed in the MDOT Road Design Manual, Chapter 5.

2.4.2 Drainage Considerations

Drainage of stormwater, either to or from state trunkline ROW, may involve the use of public or private stormwater conveyance systems. Acceptable drainage outlets include inland lakes or streams, county drains, and storm sewers or ditches owned by other public agencies. If a connection to a combined sewer exists, alternatives are required to be explored to separate storm and sanitary flows. If separation is infeasible and an agreement is in place, a combined sewer may serve as an acceptable outlet within the

terms of the agreement. New connections to combined sewers or connections that are not consistent with the existing agreement are not acceptable (Refer to Chapter 7, Inlet and Enclosed Storm Drainage Systems.). Whenever a stormwater conveyance system from a state trunkline project is connected into an existing public or private stormwater conveyance system outside of MDOT ROW, a written agreement on the design, construction, and future operation and maintenance of the stormwater system is required with the system owner. Discharges to systems that operate under a Municipal Separate Storm Sewer System (MS4) permit must satisfy the conditions of the receiving system MS4 permit as well as MDOT's MS4 permit, including authorization for the discharge from Michigan Department of Environment, Great Lakes, and Energy (EGLE).

Projects that may impact intracounty and intercounty drainage districts (refer to **Section 2.4.3**) require the Project Manager to coordinate the work with the MDOT Drainage Coordinator and the Region/TSC Drainage Coordinator. The MDOT Drainage Coordinator will coordinate with the Drain Commissioner or Intercounty Drainage Board. The Project Manager is responsible for contacting the Government Trunkline Engineer – Development Service Division (DSD) for the development of any agreements. Hydrologic and hydraulic analyses are needed to determine the impact of the connection on the stormwater system(s) and are required to be reviewed and approved by the Hydraulic Unit Supervisor.

2.4.2.1 Drainage Conditions and Participation with Local Agencies/Private Entities

The Project Manager must be aware of the various drainage conditions that may necessitate participation costs and agreements with local agencies, County Drain Commissioners, Drainage Boards, and private entities. When cooperative drainage projects with local agencies or private entities are more economical than separate projects for the participating parties, an equitable sharing of cost requires a written agreement. In all cooperative drainage projects, stormwater conveyance systems are required to be designed according to the design guidelines in the current Department Design Manuals or other mutually acceptable design procedures.

The following conditions may be encountered by a project:

Condition No. 1, New MDOT System

MDOT intends to build a new storm sewer that will not involve another owner's stormwater conveyance system. MDOT is required to secure sufficient ROW to construct, maintain, and secure the proposed MDOT drainage infrastructure including receiving storm sewers, detention/retention facilities, etc.

Condition No. 2, Additional Drainage Area

MDOT intends to build a new storm sewer and the local agency requests MDOT to increase the proposed pipe sizes to accommodate drainage areas not naturally contributing to the highway ROW.

The local agency is required to submit a resolution requesting additional capacity in the MDOT stormwater conveyance system. The resolution is required to state that the local agency will participate in the increased construction and future operation and maintenance costs to the MDOT stormwater system. The local agency is required to provide a plan showing the proposed drainage area to be accommodated and the computations for the expected flow. All stormwater entering the MDOT drainage system is required to comply with the provisions of MDOT's MS4 permit. The pro rata share of stormwater runoff chargeable to the local agency is based upon current MDOT criteria (refer to **Section 2.4.2.2**).

Condition No. 3, Local Sewer Separation and Shared System Projects

A municipality, county drainage district or drainage board, or private entity is planning a drainage improvement of an existing or proposed stormwater conveyance system. This system may be in an area where MDOT has no programmed construction projects for improvement and MDOT is requested to participate in the proposed drainage improvement, sewer separation, or stormwater treatment project. MDOT will cooperate and give financial support to needed improvements based on the participation costs outlined in **Section 2.4.2.2**.

The process to participate in the eligible cost for these projects is as follows:

1. Request to Participate

A letter from the local agency requesting participation is required to be sent to the Region Engineer and copied to the MDOT Drainage Coordinator.

The MDOT Drainage Coordinator will notify the Hydraulic Unit Supervisor of the pending request. The Hydraulic Unit Supervisor will determine adequate capacity for MDOT stormwater runoff and the participation in the project's costs based on **Section 2.4.2.2**. The local agency also is required to provide a detailed engineer's cost estimate for MDOT participation. Any cost feasible alternative may be investigated by MDOT.

2. Approval to Participate

The MDOT Drainage Coordinator will notify the local agency by letter of MDOT's decision to participate. The costs incurred after the approval letter is eligible for reimbursement at the determined participation percentage based on contribution of flow. The project plans and hydraulic analysis are required to be reviewed for development of an agreement that covers MDOT's participation percentage in the costs of construction and future operation and maintenance of the system.

3. Determine Funding Source

The Region Engineer is responsible for programming and requesting funding for the project and notifying the MDOT Drainage Coordinator of available funds. MDOT project costs are eligible for federal funds from the date of MDOT's

approval to participate. Dependent upon scope and timing of the project, funds from the Drain Assessment Fund may be used.

4. MDOT Review, Agreement and MDOT Construction Permit Coordination

The local agency is required to provide final plans, specifications, and the hydraulic analysis, as outlined in **Section 2.4.2.2**, to the Drainage Coordinator for review and approval of participation costs. The Drainage Coordinator is responsible for contacting the Government Trunkline Engineer – DSD for drafting the cost participation agreement.

If the project involves construction within the MDOT ROW, the local agency is required to contact the Construction Permit Staff at the local MDOT Transportation Service Center for instructions on how to submit for an MDOT ROW construction permit. Once the application and site plans/drainage plans are submitted electronically, they are routed to the Hydraulic Unit staff for review and approval. The permit is issued after all applicable reviews have been completed and approved. Refer to **Section 2.4.8** for additional information.

The participation agreement covers the final estimated participation percentages costs for construction, future operation, and maintenance. It is the intent to have a fully executed agreement prior to the construction start. If the local agency's schedules and contract obligations require them to start prior to the fully executed agreement, the letter submitted to them acknowledging MDOT participation (step 2) establishes when costs are eligible for reimbursement. If federal funds are used, the project is processed under the exempt status, regardless of costs (refer to FHWA letter dated June 3, 1994).

Condition No. 4, Replace or Improve Existing System

When MDOT intends to replace or improve an existing open or closed stormwater conveyance system, the Project Manager is required to analyze the potential drainage impacts to and from abutting properties. MDOT will accept the existing contributing drainage from abutting property to the ROW.

2.4.2.2 Participation Agreements and Costs Agreements

Terms that govern the construction, operation, and maintenance of all cooperative sewer projects will be outlined in an agreement. The Project Manager is responsible for contacting the Government Trunkline Engineer - DSD for the development of new agreements or to find past or existing agreements.

Costs - For MDOT construction projects with local authority participation costs, the Project Manager will obtain the participation costs according to either the "flow share" or "equivalent runoff acres" methods.

In cooperative drainage projects done by others, the engineering and contingency costs should be 25% of the estimated construction cost. This figure is subject to adjustment on the final billing based on actual costs.

The actual cost is the expense of furnishing and placing the trunk sewer, including manholes, and the construction of open channel conveyance systems. Incidental items not required for the road project are included in the total actual cost. Items such as tree removal, maintaining traffic, and other incidentals, which are required for the road project or the MDOT sewer construction, are not included.

Flow Share Method - The total cost is divided between MDOT and the local agency or a private entity in proportion to the peak flow rate each party is contributing to each section of storm sewer. The design flow condition for each contributor should be based on the same storm frequency (refer to **Figure 2-1**). If the local agency is a county drainage district or drainage board established under the Drain Code, the costs shared are based on a pro rata share of stormwater runoff per the promulgated rules established under Section 14a of Act 51, Public Acts of 1951 as amended (refer to Design Engineer - Hydraulics) (Refer to **Appendix 2-D**).

The participation cost should be based on the same frequency storm runoff quantities as used in the Department's design. If there is a difference in the frequencies used, the stormwater quantity from the local authority is required to be physically restricted at the junction of the local and Department facilities. The agreed upon rate of runoff would be metered into the Department's facility by using structural controls such as retention basins, sewer size, or orifices.

If different storm frequencies are used by the respective stormwater systems, the runoff quantity computed for the local authority is multiplied by a factor to equal the recurrence interval of the local authority and the Department, based on **Table 2-1**.

Figure 2-1. Sewer Participation Sketch

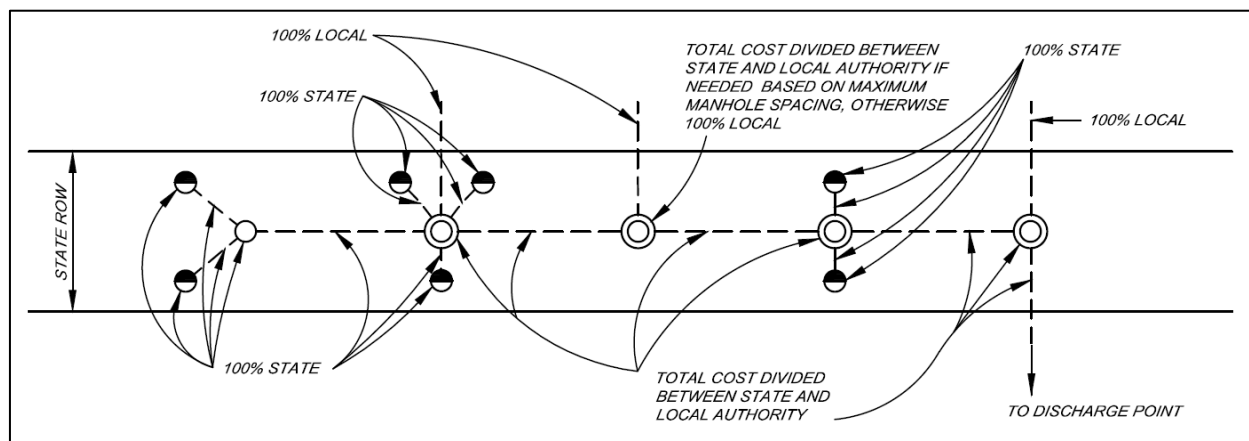


Table 2-1. Recurrence Interval Factors (Rule 9 for Section 14a of Act 51, Public Acts of 1951)

Recurrence Interval Used by Local Authority	Factor
50% AEP (2-year) storm	1.0
20% AEP (5-year) storm	1.3
10% AEP (10-year) storm	1.6
2% AEP (50-year) storm	2.2

For Example: When a local authority's flow (Q) contribution to a storm drainage facility is based on a 10% AEP (10-year) storm frequency in conjunction with the Department's flow based on a 2% AEP (50-year) storm frequency, the local authority's flow would have to be multiplied by 2.2/1.6 to determine construction costs from the comparative flows.

Equivalent Runoff Acres Method -The pro rata share of stormwater runoff from the landowner, public corporation, and roadway authority's parcel of land is determined for the drainage area based on the equivalent runoff acres. This method is usually applicable to county drain projects. Compute the equivalent runoff acres (E) using the formula:

$$E = CA$$

Where: E = Equivalent runoff acres

C = Runoff coefficient

A = Drainage area

Stormwater runoff based on equivalent runoff acres is determined for the entire drainage area. Compute the average runoff coefficient for individual parcels. Ranges of runoff coefficients for various land surfaces are provided in **Table 2-2** (Michigan State Administrative Rules R 280.9).

If E is affected by the installation of stormwater detention/retention facilities, E is based on the existing, pre-development conditions. The cost of the construction of such facilities is based on the supplemental benefit.

Table 2-2. Range of Runoff Coefficients for Various Land Surface Types

Type of Surface	Runoff Coefficient
Concrete or Asphalt Pavement	0.80-0.90
Commercial and Industrial	0.70-0.90
Gravel Roadways and Shoulders	0.50-0.70
Residential - Urban (Less than 1/2-acre lots)	0.50-0.70
Residential - Suburban (Greater than or equal to 1/2-acre lots)	0.30-0.50
Undeveloped	0.10-0.30
Berms	0.10-0.30
Agricultural - Cultivated Fields	0.15-0.40
Meadow, Pasture, Forested Areas	0.10-0.40

For railroad ballast, assume the same runoff coefficient as Gravel Roadways and Shoulders. Lower runoff coefficients are selected for flat slopes, permeable soils, or pervious pavement. Higher values are selected for steeper slopes and less permeable soils or surfaces. It is required that MDOT approve the runoff coefficients for the individual surfaces as part of the development of a cost share process.

Supplemental Benefits - Supplemental benefits may be derived from the installation of facilities, structures, or mechanical devices jointly determined to be necessary by the landowner or public corporation and MDOT. The costs of supplemental benefits are determined separately from the cost of the stormwater conveyance system and outlined in an agreement between MDOT and the local agency or private entity.

2.4.3 Intracounty and Intercounty Drainage Systems for State Trunkline Stormwater

When a project involves drainage to an intracounty or intercounty drain, the Project Manager is required to coordinate the submittal of plans (required by law under the Drain Code) to the County Drain Commissioner or Drainage Board, with the MDOT Drainage Coordinator and the respective Region/TSC Drainage Coordinator(s). Resolution of any drainage issues by the Project Manager and Region representative is required to be approved by the MDOT Drainage Coordinator (**Appendix 2-D**).

An intracounty or intercounty drainage district is a public corporation and has all the legal characteristics attributable to corporations.

Any project that may change the amount of stormwater flow to an intracounty or intercounty drainage district stormwater system requires hydrologic and hydraulic analyses. Such a change may impact MDOT apportionment within the drainage district and is required to be reviewed and approved by the Hydraulic Unit Supervisor.

County Drain Commissioners are required to review and approve the transfer of stormwater from one drainage district to another. A transfer requires an agreement between MDOT and the County Drain Commissioner or Drainage Board. A certificate is required from a licensed professional engineer stating either (MCL 280.433.2):

1. The lands to be added to the drainage district naturally drain to the county drain
2. The existing county drain is the only reasonably available outlet for the drainage and there is sufficient capacity in the drain to add these lands without detriment to or diminution of the service of the drain to the drainage district.

If it is necessary to transfer stormwater between drainage districts, the Region/TSC Drainage Coordinator and MDOT Drainage Coordinator are required to resolve the issue with the County Drain Commissioner as early in the design process as possible.

Send copies of all correspondence with County Drain Commissioners to the MDOT Drainage Coordinator and the Region/TSC Drainage Coordinator(s).

2.4.4 Relocation of Existing Stream

Avoid relocating an existing stream for highway construction. When necessary for construction and/or economic reasons, an existing stream may be relocated after mutual acceptance between MDOT, EGLE, and, if applicable, the property owner or local Drain Commissioner or Drainage Board (may require a drainage easement and relocation agreement in the name of the county or intercounty drainage district). EGLE permit(s) are required. Relocation of a stream requires a detailed hydraulic analysis as well as channel training/protection devices and other mitigation measures. The Project Manager is required to coordinate with the Hydraulic Unit Supervisor conducting this analysis, or reviewing and approving the analysis. The Hydraulic Unit Supervisor coordinates the review by EGLE through the Region Environmental Permit Coordinator.

2.4.5 Relocation of Existing Drainage Course

Relocating an existing drainage course may be acceptable, provided hydrologic and hydraulic calculations are performed to avoid harmful interference. Contact the County Drain Commissioner to determine if the drainage course is considered a County Drain.

2.4.6 Relocation of Field Tile Drains

Field tiles that may affect a construction project are required to be identified early to reduce problems that may originate in the design. Use the following steps to provide consistent treatment for disrupted tile systems:

1. Plot all existing field tiles identified during the early planning process on base plans. Check any environmental assessment/impact document for identifying field tile location.
2. Transmit base plans showing the known information on field tile drain systems to the Region/TSC Drainage Coordinator for submittal to the County Drain Commissioner's office. The Region/TSC Drainage Coordinator will request any required additions or corrections to the field tile drain. This is required to be completed prior to the Plan Review Meeting.
3. Update plans to include any additions or corrections of the existing facilities provided by the County Drain Commissioner's office.
4. Provide Real Estate with a proposed option for correcting known drainage tile systems with the preliminary and final ROW submittals. Refer to MDOT Road Design Manual, Chapter 5. The following is in order of design preference.
 - A. Continue the drainage under the roadway with an appropriate size replacement pipe.

When the replacement pipe is within the influence of the roadway, use the current culvert and sewer specifications. Place manholes outside of the ROW for cleanout purposes. Individual tiles are required to be collected in a header and conveyed across the ROW at a minimal number of locations.

- B. Collect the flow from the existing field tiles in a header and outlet it into the highway ditch using a minimal number of outlet locations.

Temporary ROW needs to be acquired for any work outside the ROW, including connections to private systems.

2.4.7 Design Procedures for Unknown Field Tile Location

On the miscellaneous quantity sheet, provide an estimate of drainage structures, drainage structure covers, and 8-inch, 10-inch, and 12-inch-diameter pipe for use when field tiles are encountered during construction that were not identified in the plans. The Construction Engineer is required to contact Real Estate to obtain written permission from the property owner (or Drain Commissioner in the case of County Drains) prior to alteration of the field tile system.

2.4.8 Permitting Drainage Connections to State Trunkline Drainage Systems

New or altered drainage connections to the state trunkline drainage system are applied for and approved in the [MDOT Permit Gateway](#). Permit applications are required to include a completed MDOT Drainage Design Checklist for Accessing State Trunkline Drainage Systems (Form 2484) with a registered Professional Engineer's seal and signature and supporting hydrologic, hydraulic, and water quality analyses. MDOT does not accept drainage connections that increase existing flow rates, come from land that

does not naturally drain to state trunkline ROW, or violate MDOT's MS4 permit requirements (refer to the [MDOT Stormwater Treatment Manual](#)).

Follow the guidance provided on MDOT Form 2484 for drainage standards and required documentation. A completed 2484 Data Summary Table and supporting hydrologic and hydraulic analyses are required to show post-construction flow rates equal to or less than existing pre-project flow rates that will not cause a harmful interference to state trunkline ROW or adjacent properties for all storms up to and including the 1% AEP (100-year) storm event (refer to **Appendix 2-B**). If attenuation is needed (i.e. detention or infiltration basins) to maintain existing flow rates, calculate flow rates and runoff volumes using a method that produces a runoff hydrograph (refer to Chapter 3, Hydrology, Section 3.5.1) and use a hydrograph routing method to route the proposed hydrographs through the attenuation system and outlet (refer to Chapter 8, Stormwater Storage Facilities for Flood Control, Section 8.7).

For additional information, refer to **Appendix 2-B** and the Administrative Rules Regulating Driveways, Banners and Parades on or Over Highways, Public Act 200 of 1969 in **Appendix 2-D**.

2.4.8.1 Enclosed Ditches

New driveway culverts, driveway culvert extensions, and ditch enclosures located in state trunkline ROW are applied for and approved in the [MDOT Permit Gateway](#). Permit applications are required to include engineered plans with a registered Professional Engineer's seal and signature and supporting hydrologic and hydraulic analyses. The hydraulic analysis is required to include a comparison of existing and proposed conditions and show no harmful interference to state trunkline ROW or adjacent properties, for all storms up to and including the 1% AEP (100-year) storm event.

Follow guidance in Chapter 3 for hydrologic procedures. Follow guidance in Chapters 4 and 5 for maximum ditch freeboard, culvert headwater requirements, and required calculations. Follow guidance in Chapter 7 for maintenance access manholes for enclosures greater than 300 feet in length.

Proposed enclosures of the MDOT stormwater conveyance system where there is less than 200 feet of open ditch between the end of the enclosure and the outfall will not be permitted due to MS4 regulations.

Where applicable, the applicant must provide a copy of approved Part 301 and 31 permits from EGLE.

Refer to **Section 2.4.2** for requirements for local agency enclosures that extend outside the state trunkline ROW.

2.4.8.2 Longitudinal Storm Sewer Systems

Longitudinal storm sewer construction in state trunkline ROW is only permitted to Drain Commissioners, drainage boards, and other governmental agencies upon

approval by the MDOT Drainage Coordinator. In all cases, the local governmental agency is required to attempt to secure its own ROW or easements for its systems. Refer to **Section 2.4.2** for necessary participation and agreement requirements. Permit applications are applied for and approved in the [MDOT Permit Gateway](#) and require engineering plans with a registered Professional Engineer's seal and signature and supporting storm sewer analysis. Follow guidance for hydrologic procedures in Chapter 3 and storm sewer design in Chapter 7.

2.4.8.3 Storm Sewer Taps

Permits for storm sewer taps and crossings are issued to private individuals, companies, and local governmental agencies in the [MDOT Permit Gateway](#), following guidance in **Section 2.4.8**.

2.4.8.4 Altering Grading or Drainage within State Trunkline ROW

Follow the design requirements covered in the MDOT Drainage Manual.

Where applicable, the applicant is required to provide a copy of approved Part 301 and 31 permits from EGLE.

2.4.8.5 Additional Drainage from Local Agencies or County Drains

Additional water from local agencies may be accepted if the state trunkline ROW drainage system is not adversely affected. An agreement between MDOT and the local agency or County Drain that has jurisdiction over the drainage outside the state trunkline ROW is required to be included as part of the drainage connection application. Refer to **Section 2.4.2** for more information.

2.4.8.6 Permit Routing

The MDOT Construction Permit Procedure Manual gives MDOT internal staff guidance on when to route permits to the Hydraulic Unit in the [MDOT Permit Gateway](#).

2.5 DRAINAGE DESIGN OVERVIEW

Water is not limited by jurisdictional boundaries. It is incumbent on the designer to know how water enters the ROW, how it is conveyed across or through the ROW, and where it is discharged. Designers are required to know how to address both the quantity of water and the potential impact on water quality associated with transportation projects.

Additionally, the designer is required to be trained in site hydrology, open channel and culvert hydraulics, storm sewer design, and have a thorough understanding of the following:

- Legal precedent to discharge surface water (refer to **Appendix 2-B**)
- Various types of watercourses and their legal standing
- MDOT's legal right, authority, and responsibilities regarding drainage to and from MDOT ROW
- How drainage rights influence project designs
- The coordination needed with other public agencies (refer to **Section 2.4.2.2**).
- Post-construction stormwater control measures (PC-SCMs) for water quality and channel protection.

2.6 GENERAL DESIGN GUIDANCE

The Project Manager is responsible for delegating duties under Planisware Tasks 3520 and 3522 of the MDOT Project Management Development/Design Task Manual. Refer to the Drainage Study Outline in **Appendix 2-F**. Refer to the Hydraulic Report and Scour Report in Chapter 6.

2.6.1 Route Location and Flood Hazards

The primary consideration when determining the location of a drainage facility in highway planning is the impact evaluation of floodplain encroachments for a stream crossing. Hydraulic and environmental considerations of highway river crossings and encroachments are presented in FHWA HEC-16 (2023).

Flood flow characteristics at a highway stream crossing are analyzed to determine their effect on the highway. The effects of the highway on the conveyance of the flood flow or floodway are evaluated. This evaluation can assist in determining locations where construction and maintenance will be unusually expensive or hazardous. Thus, it is important to identify the flood hazards prior to any highway improvement to determine if the flood hazard will increase, decrease, or stay the same with and without the proposed highway improvement. Consider the effects of flood hazards to upstream private property, i.e., increasing floodwater elevations or diverting onto previously unaffected property. Some downstream concerns include velocity increases or alignment issues. Satisfactory solutions may be obtained by making only minor changes in selected routes to take advantage of natural hydraulic features at alternate sites.

2.6.2 Construction Site Soil Erosion and Sedimentation Controls

Construction Soil Erosion and Sedimentation Control (SESC) Measures are essential to maintain water quality and avoid sediment discharges to waters of the State. The MDOT Soil Erosion and Sedimentation Control Manual provides guidance on how to choose the correct SESC measures for each construction site and where to obtain design information. All designs are required to comply with Part 91 of NREPA.

2.6.3 Intra-agency Coordination and Environmental Permits

Intra-agency coordination and environmental permits are discussed in the MDOT Road Design Manual (Chapter 10).

Specific federal, state, and local permits required for a highway project are required to be identified in the environmental clearance document early in the Early Preliminary Engineering (EPE) phase. For federal permits, applications are required to be filed with the Coast Guard and/or the Corps of Engineers for construction of bridges over navigable waters, associated ancillary structures, and other regulated activities. Refer to **Appendix 2-C** on federal laws. MDOT's Environmental Clearance process is outlined in the MDOT Road Design Manual (Chapter 10).

Prior to initiating design work, the designer is required to review the environmental documentation with the Region Environmental Permit Coordinator to identify regulatory commitments, constraints, and permits required. Applicable permits from the following list are required to be obtained before construction begins and preferably before detailed plans are prepared:

- Dam Safety, Part 315
- Shorelands Protection and Management, Part 323
- Sand Dunes Protection and Management, Part 353
- Great Lakes Submerged Lands, Part 325
- Section 404 of Clean Water Act
- Navigation Clearances, Coast Guard, Sections 9 and 10, Rivers and Harbors Act
- Water Resource Protection, Part 31 and its Administrative Rules (Part 21) R 323.2161 - R 323.2190 (refer to **Appendix 2-G** for additional floodplain information)
- County Drain Coordination, Drain Code (refer to **Appendix 2-E**)

References

MDOT does not claim responsibility for the information at these links or their maintenance.

Michigan Department of Transportation. [Online Portal]. *MDOT Permit Gateway*. State of Michigan.

<https://www.michigan.gov/mdot/business/permit-gateway>

Michigan Department of Transportation. (Continuously Updated). *MDOT Project Management Development/Design Task Manual (Preconstruction Process Documentation Manual)*. State of Michigan.

<https://www.michigan.gov/mdot/business/design>

Michigan Department of Transportation. (Continuously Updated). *MDOT Road Design Manual*. State of Michigan.

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Michigan Department of Transportation. (Continuously Updated). *MDOT Soil Erosion and Sedimentation Control Manual*. State of Michigan.

<https://www.michigan.gov/-/media/Project/Websites/MDOT/Programs/Highway-Programs/Environmental-Efforts/Stormwater-Management/SESC-Manual.pdf?rev=617690ba5d304807a40fafd01ec7821e>

Michigan Department of Transportation. (Continuously Updated). *MDOT Stormwater Treatment Manual*. State of Michigan.

<https://www.michigan.gov/mdot/business/design>

Federal Highway Administration. (2023, January). *Highways in the River Environment: Roads, Rivers, and Floodplains*. Hydraulic Engineering Circular No. 16 (HEC-16). (2nd Ed.). FHWA-HIF-23-004. U.S. Department of Transportation.

<https://www.fhwa.dot.gov/engineering/hydraulics/pubs/hif23004.pdf>

If you require assistance accessing this information or require it in an alternative format, contact the Michigan Department of Transportation's (MDOT) Americans with disabilities Act (ADA) coordinator at Michigan.gov/MDOT-ADA.