

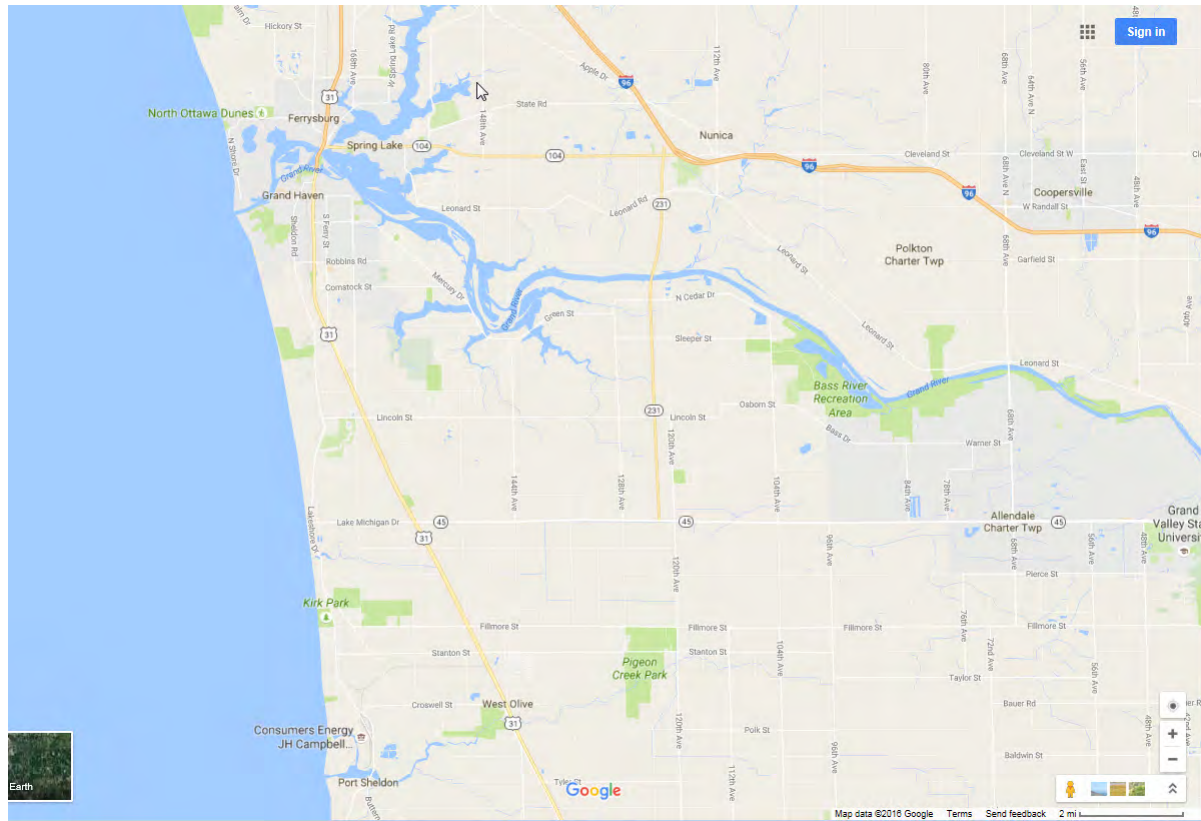
M-231 and Water Quality



Ottawa County Water Quality Forum
November 21, 2016
James Fortney, MDOT

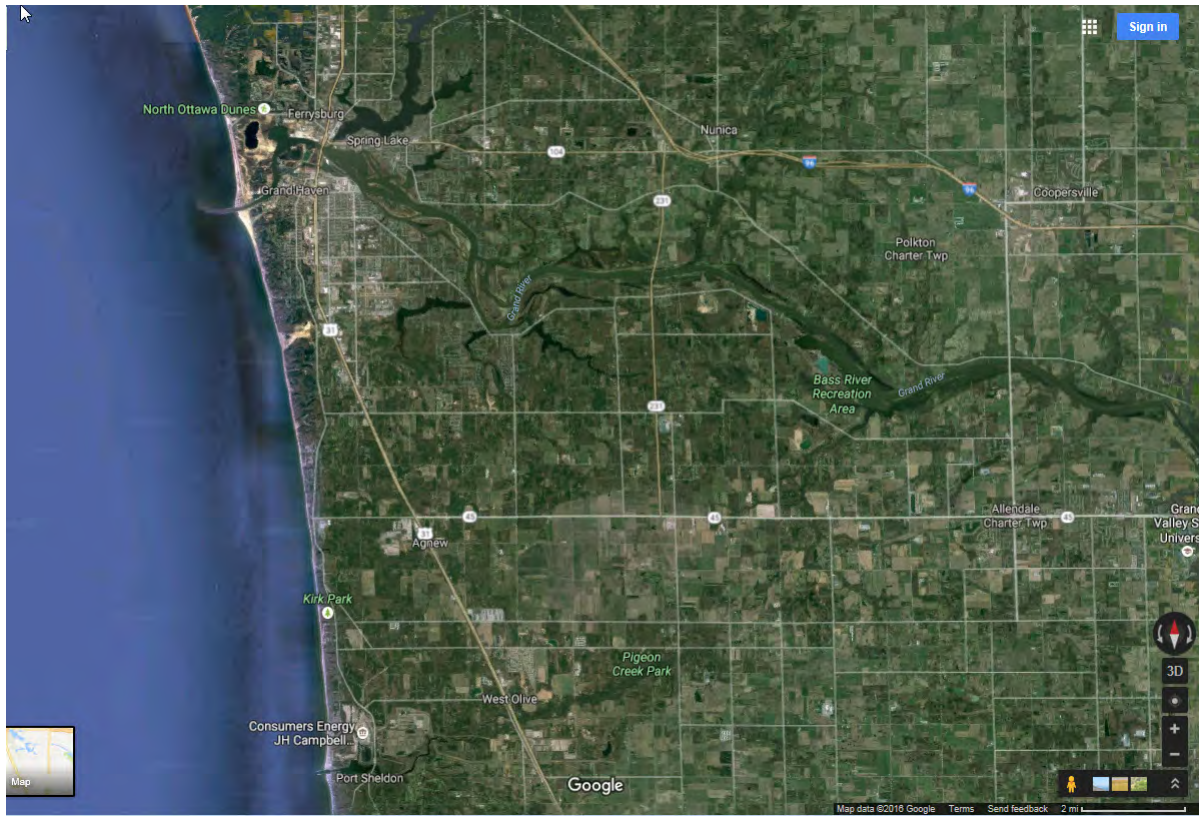
M-231 Facts:

7-Miles long
2-Lane
Limited Access Highway
Connects I-96 and M-45



M-231 Facts:

Includes Michigan's 6th longest bridge which is only the 4th crossing of the Grand River in Ottawa County



The M-231 crossing of the Grand River is 3,700 feet long



It includes a multi-use lane (MUL) which serves as a non-motorized path



M-231 also includes a 548-foot long bridge over Little Robinson Creek



M-231 at I-96 and M-104



M-231 - Facing north



M-231 facing south from M-104



M-231 facing south – Bridges over the Grand River, North Cedar Drive, and Little Robinson Creek



*M-231 over the Grand River
August 4, 2014
Michael Eastman*

Facing southwest – Bruce's Bayou on the right



Facing West – M-231 bridge piers in Bruce's Bayou



Facing west – Conner Bayou on the left



M-231 bridge piers in Conner Bayou on the south side of the Grand River



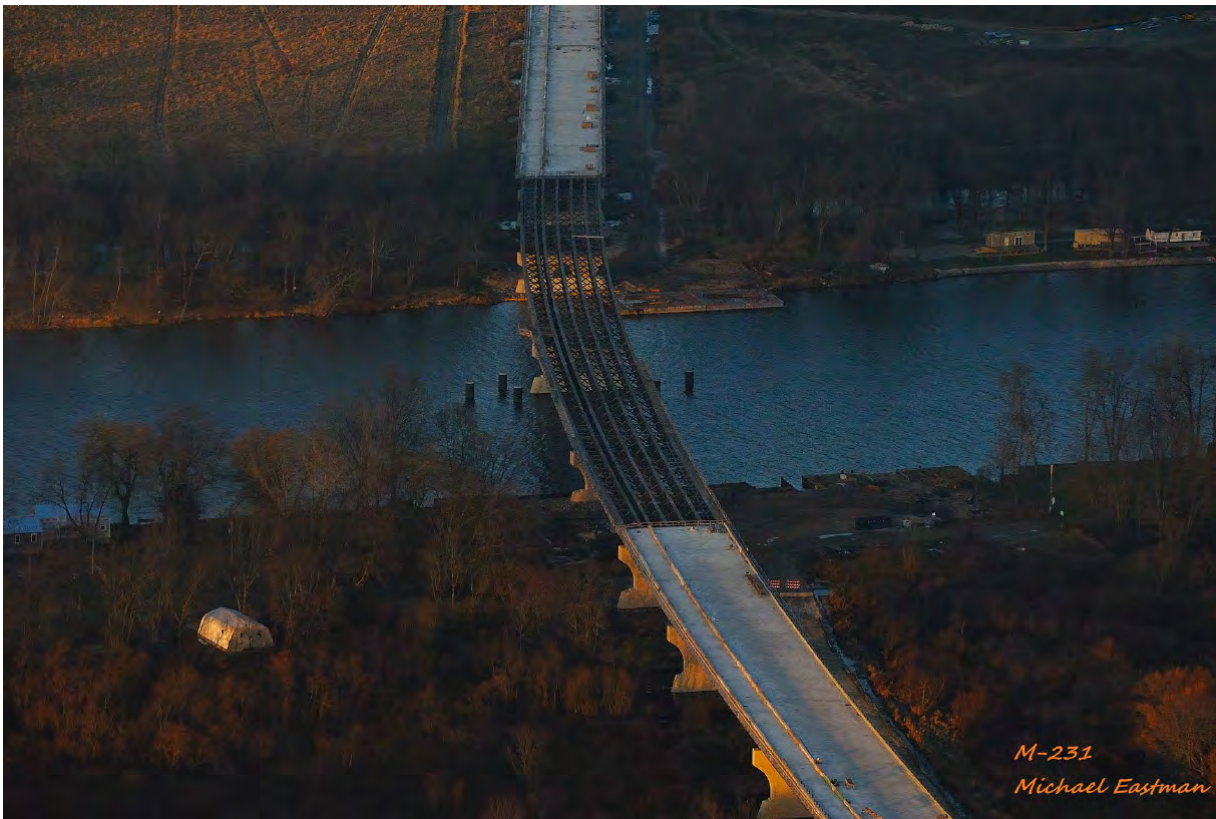
Facing upstream



Steel Beam Placement Over the Grand River



Facing north



Facing southwest



With re-steel and deck pans



Temporary BMPs used on the M-231 project

- ▶ Scheduling and staging
- ▶ Limited vegetation clearing
- ▶ Temporary haul routes
- ▶ Grading practices
- ▶ Temporary seeding
- ▶ Construction barriers
- ▶ Access roads
- ▶ Secondary containment
- ▶ Critical area stabilization
- ▶ Dust control
- ▶ Silt fence
- ▶ Turbidity curtain
- ▶ Filter bags
- ▶ Temporary seeding
- ▶ Crane mats

Temporary BMP - Tree clearing was limited to half the right-of-way width through forested areas



Temporary BMP – Silt fence along the perimeter of all earthwork



Temporary BMP – Silt Fence along the perimeter of all earthwork



Temporary BMP – Silt fence around each (future) pier



Temporary BMP – Elevated haul road in Conner Bayou



Haul route under winter conditions



Temporary BMP – Dewatering through a filter bag atop washed aggregate



Temporary BMP - Temporary seeding of the road fill slope



Temporary BMP – Dewatering through a filter bag over the Grand River



Temporary BMP – Turbidity curtain at Little Robinson Creek



Temporary BMP – Silt fence near south abutment



Temporary BMP – Temporary vegetation on areas not yet at final grade



Temporary BMP – Vegetated road fill and back slope prior to attaining final grade



Temporary BMP - Turbidity curtain in wetlands at Little Robinson Creek



Temporary BMP – Turbidity curtain along the shoreline of the Grand River



Temporary BMPs - Silt fence plus turbidity curtain



Temporary BMPs – Silt fence and temporary access road/pad at Stearns Creek



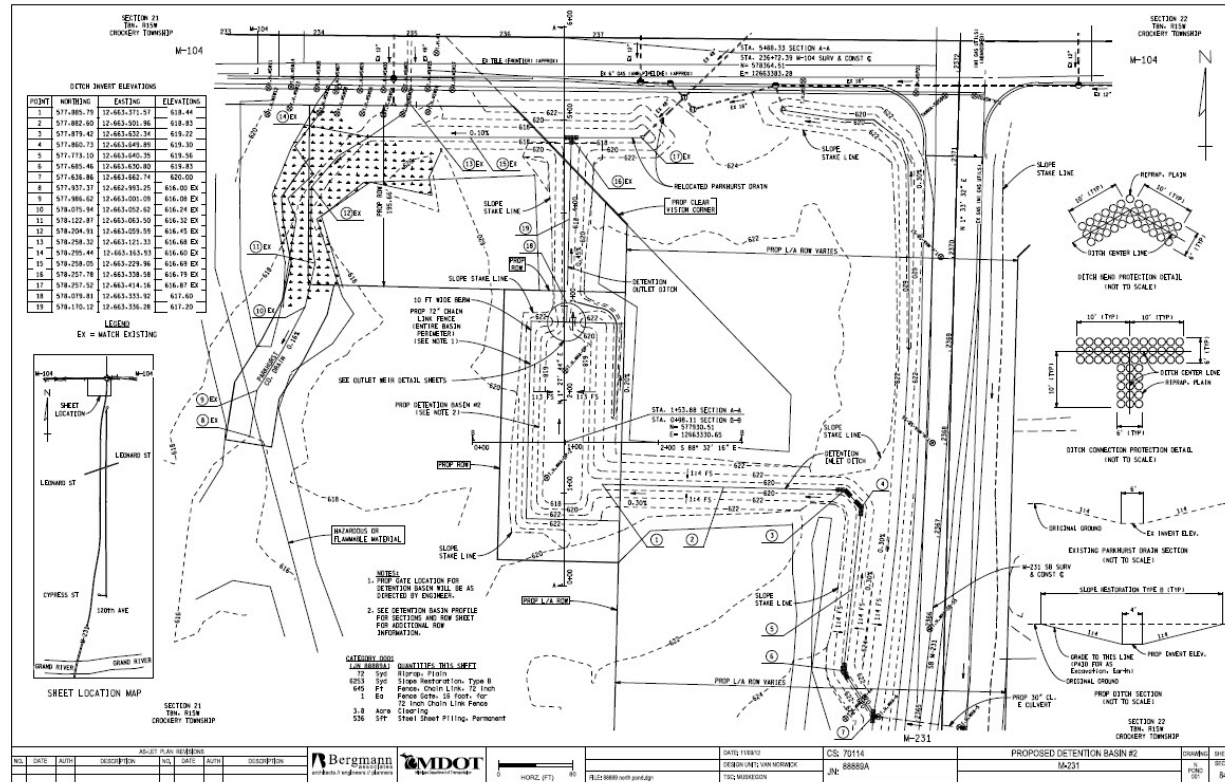
Temporary BMP – curtain in the Grand River at Pier 9



Permanent BMPs used on the M-231 project

- ▶ Detention basins
- ▶ Slope stabilization
- ▶ Channel stabilization
- ▶ Stream bank stabilization
- ▶ Check dams
- ▶ Grassed waterways
- ▶ Stabilized outlets
- ▶ Storm water conveyance channels
- ▶ Subsurface drains
- ▶ Infiltration basin
- ▶ Sediment sumps
- ▶ Permanent vegetation
- ▶ Tree planting

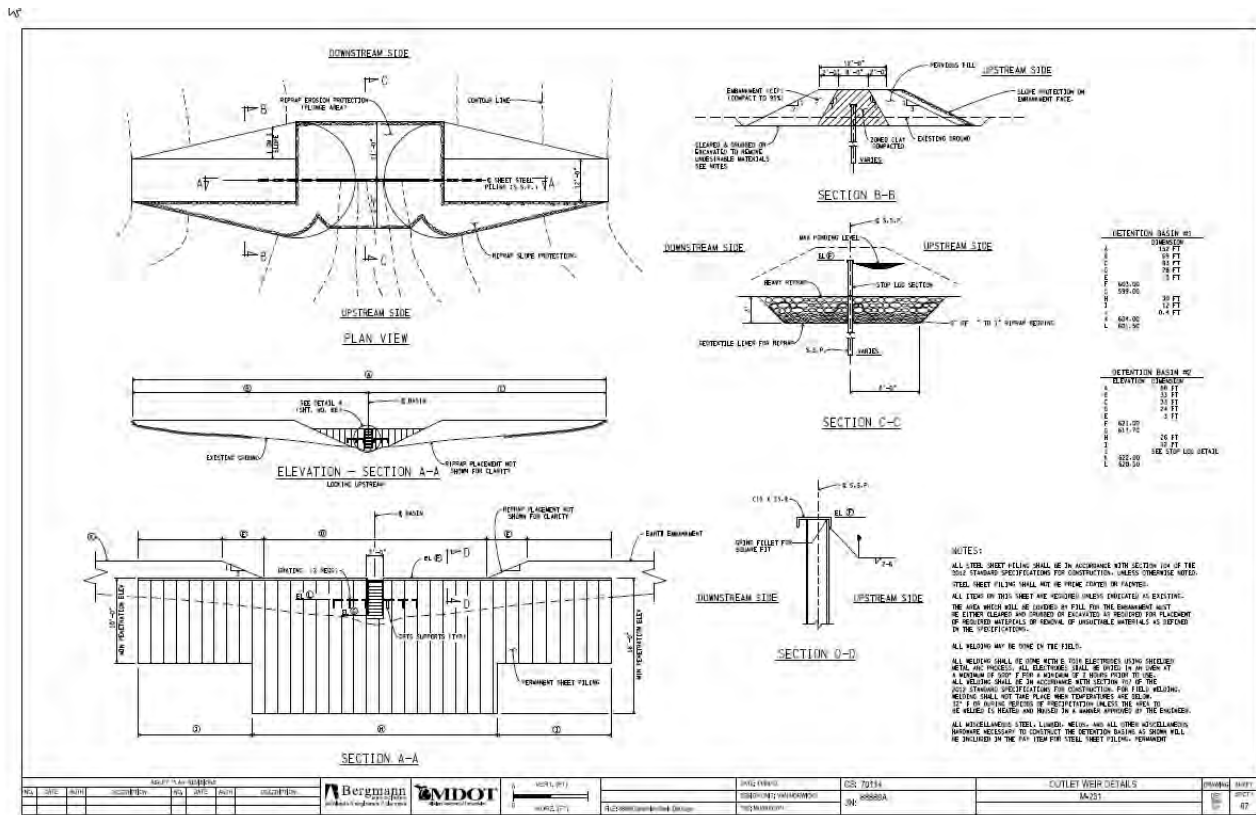
Permanent BMP – Storm water detention basin at M-104



Permanent BMP – Storm water detention basin at M-104 (under construction)

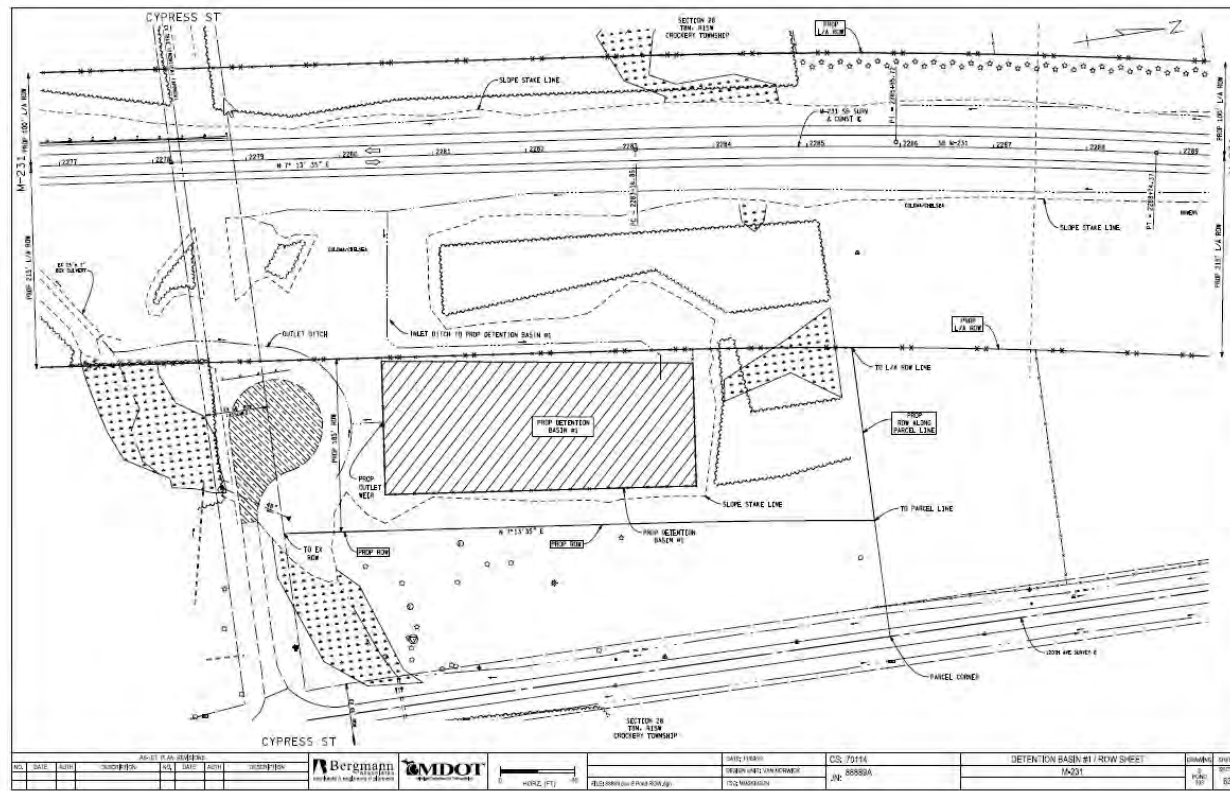


Permanent BMP – Controlled outlet from storm water basin at M-104

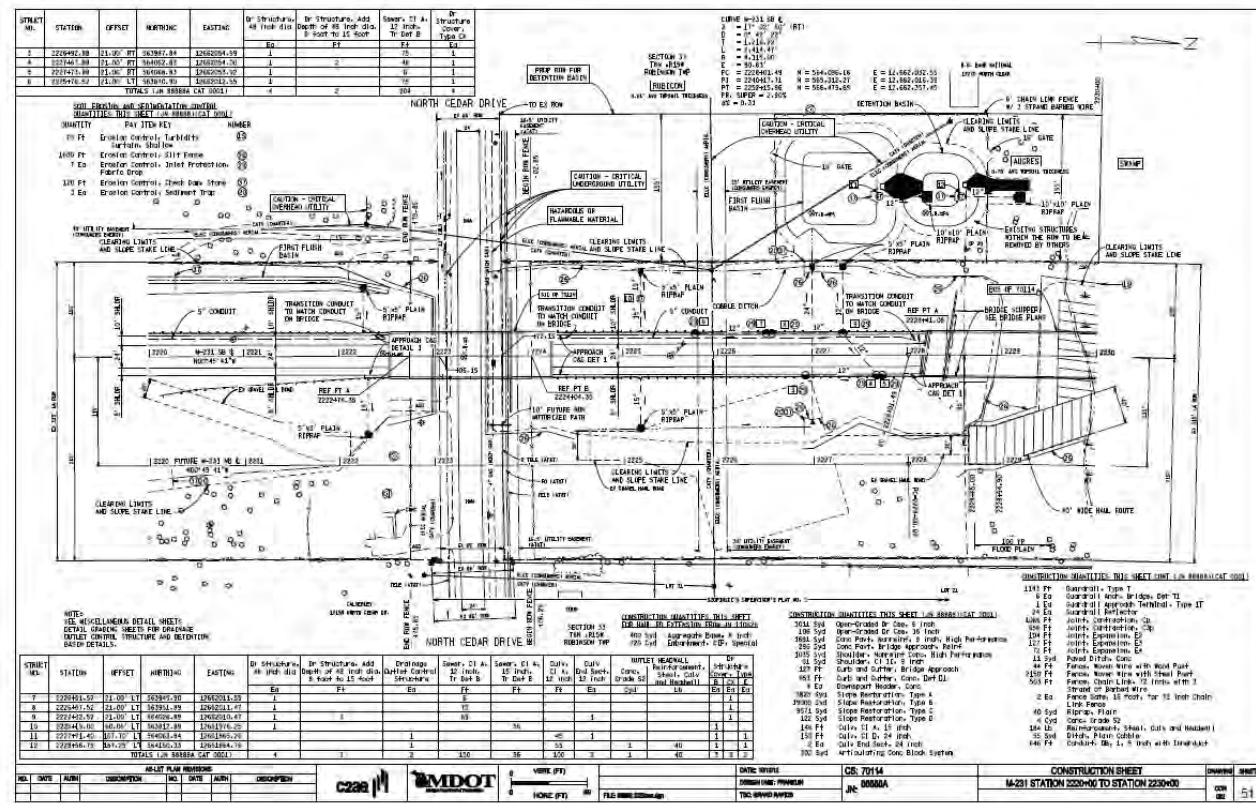


SOUTH PLANT				Bergmann		MDOT		DATE: 08/11/11		PROJECT: 70114		DRAWING: 08080A		SHEET: 42	
NO.	DATE	BY	REVISION	NO.	DATE	BY	REVISION	NO.	DATE	BY	REVISION	NO.	DATE	BY	REVISION

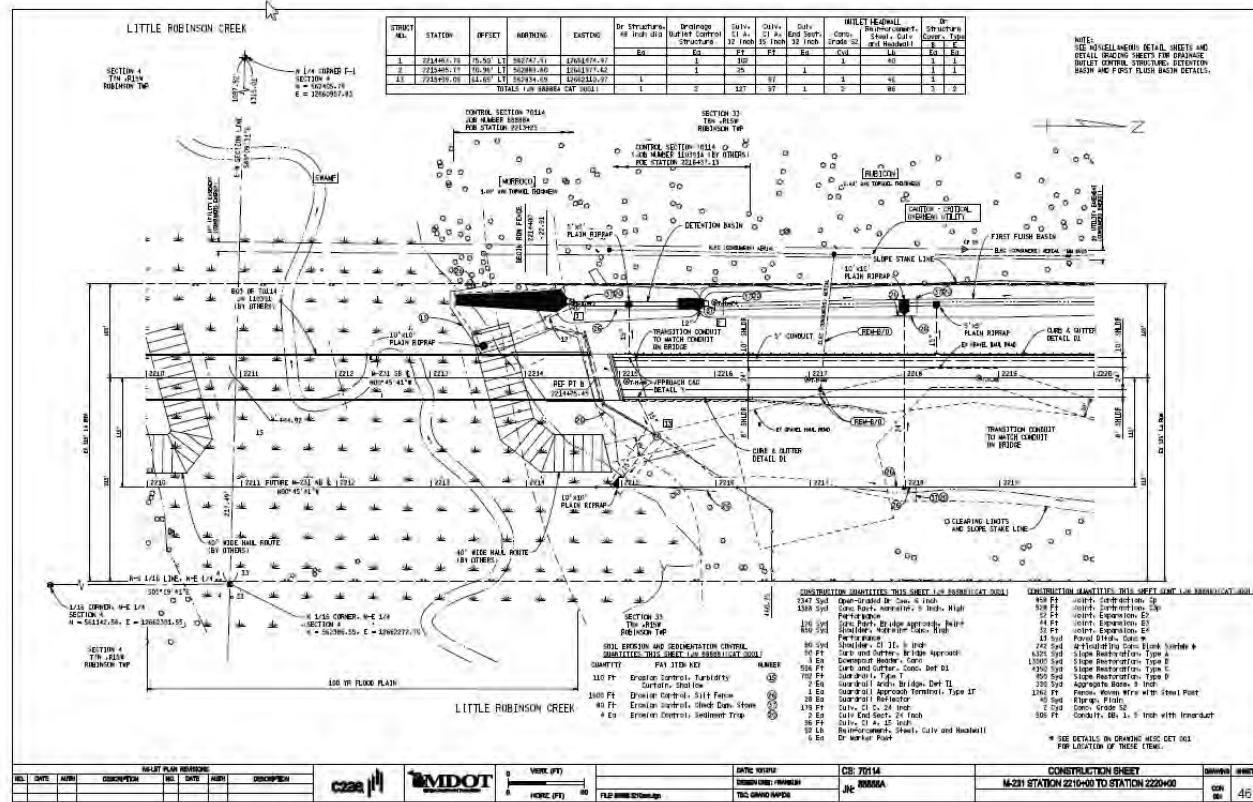
Permanent BMP – Storm water detention basin at Cypress Street



Permanent BMP – Two-celled storm water detention basin at North Cedar Drive



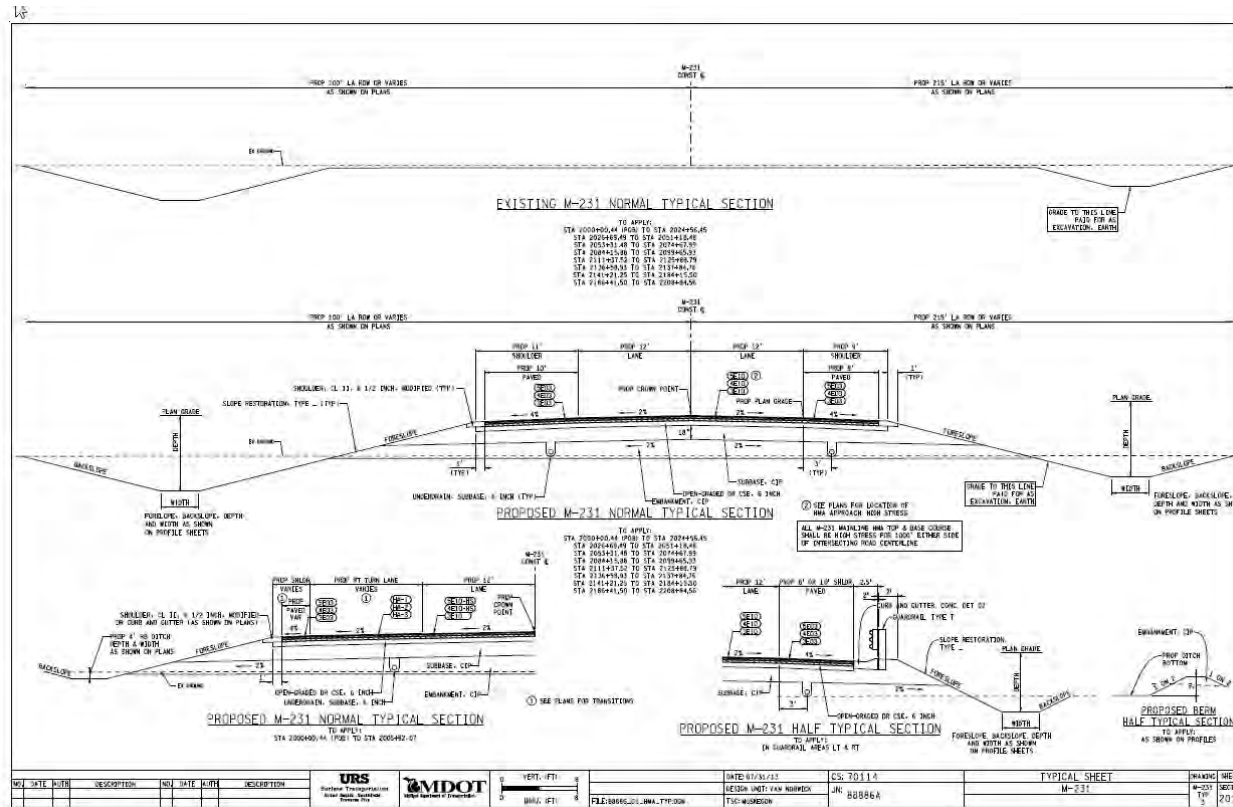
Permanent BMP – Linear storm water detention basin at Little Robinson Creek



Permanent BMP – Storm water management at Little Robinson Creek.



Permanent BMPs – Typical road section with vegetated swales (ditches) on both sides of the roadway



Permanent BMPs – Seed, mulch blanket, and check dams



Permanent BMP – Seeding and Mulch Blanket at Little Robinson Creek



Permanent BMP - Riprap lined channel at I-96/M-231



Permanent BMP – Vegetative Cover



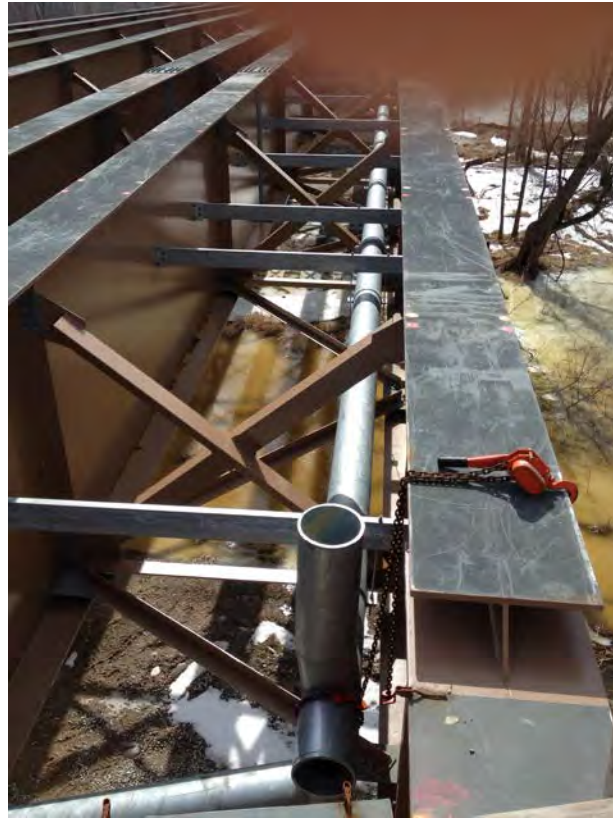
Deck drain on the bridge over the Grand River



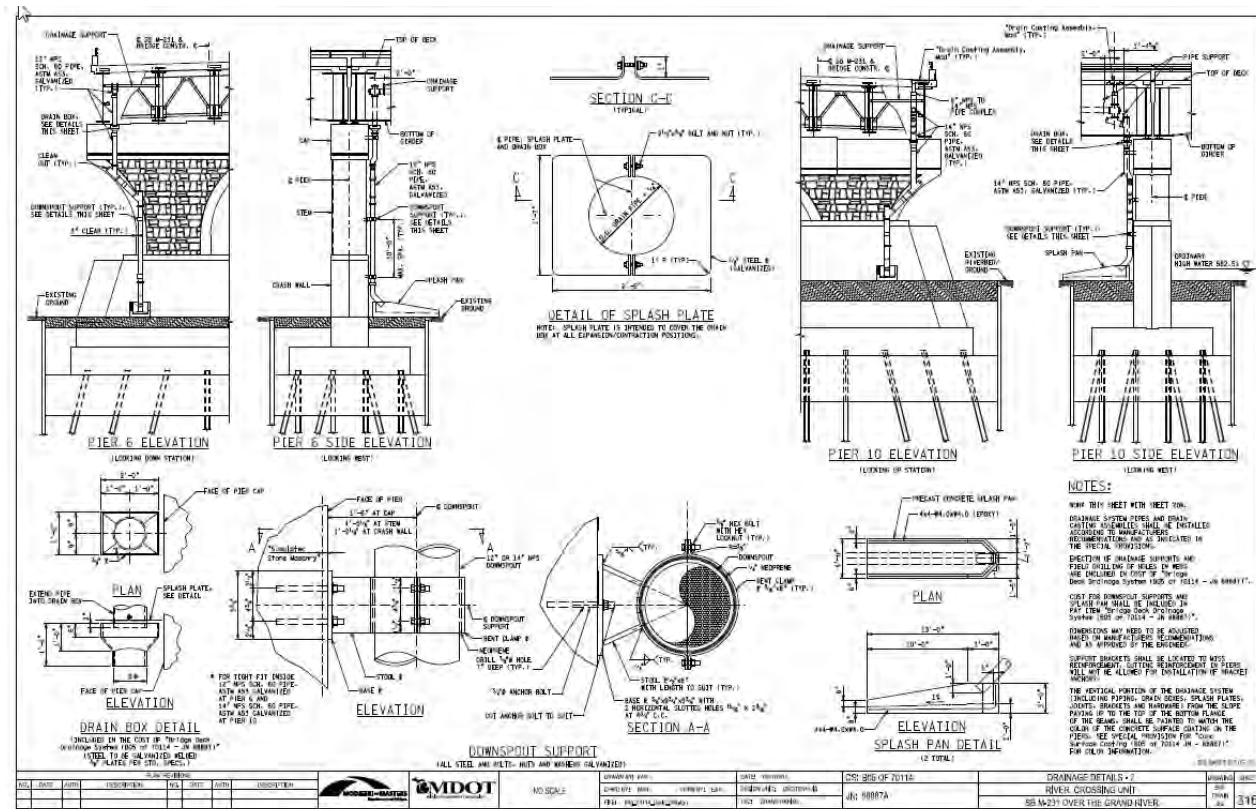
Deck drains on the multi-use lane



Storm water piping under the Grand River Bridge



Permanent BMPs – Storm water Outfall Details



Permanent BMP - Storm water piping and outfall at Pier 3



Permanent BMP - Storm water piping and outfall at Pier 6



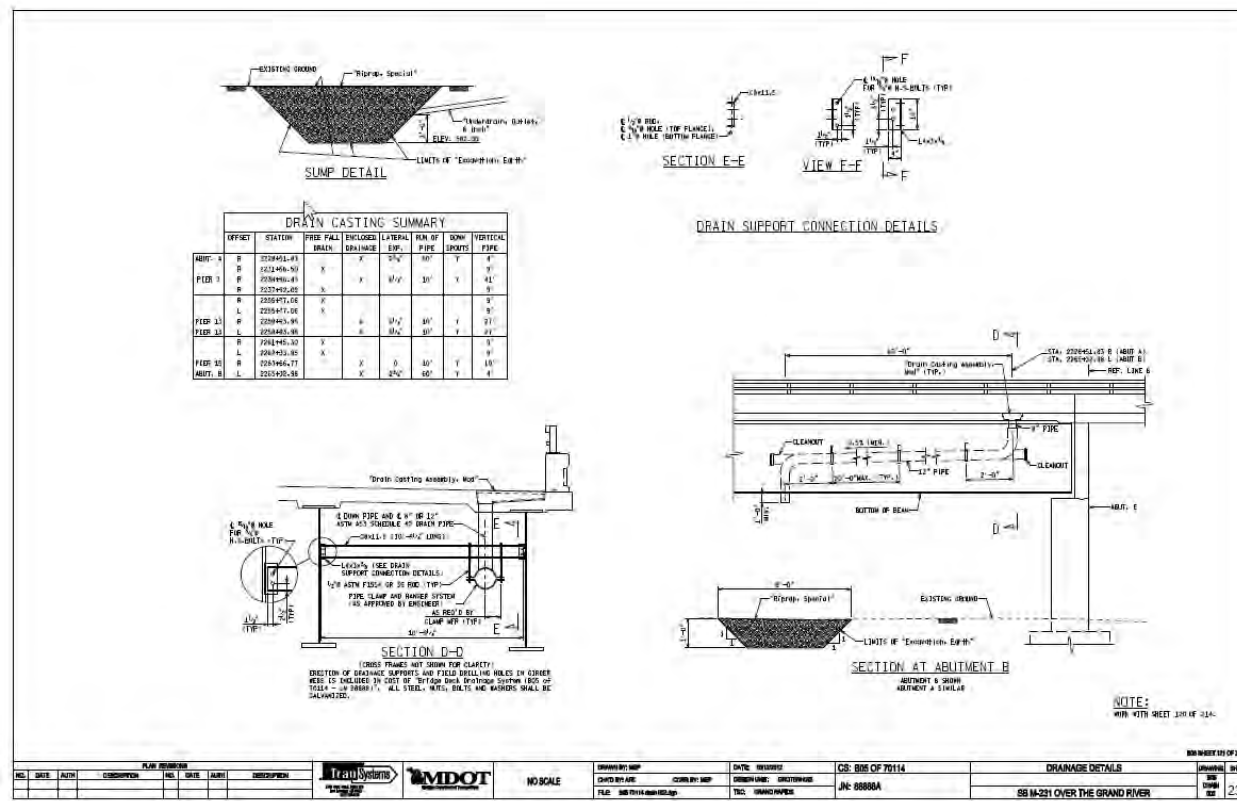
Permanent BMP – Storm water Outfall at Pier 10



Permanent BMP - Storm water outfall at Pier 15



Permanent BMP – Scupper Pad Detail



Permanent BMP - Scupper and pad at Pier 13



Permanent BMPs – Riprap pad beneath scupper



Permanent BMPs– Riprap channel between scupper pad and storm sewer (with sediment sump)



Storm water running in the gutter within the road shoulder



No standing water in the travel lanes.



Questions?

