

To

Patrick Laux, P.E.

FromJerry Shadewald
Lauren Zidek
Aaron Bowe**Date**June 12, 2013
Revised September 13, 2013**Subject**WIS 441 under the Fox River Valley
Railroad Structure**HNTB Job Number**

44386

**Technical
Memorandum**

This technical memorandum is to summarize the impacts to B-44-124 which goes over WIS 441. This bridge is known as the Fox River Valley Railroad structure that is operated by CN Railroad. The USH 41/WIS 441 Operational Needs Study is evaluating the need for roadway improvements to meet future capacity demands.

Existing Conditions

The Fox Valley River railroad structure was constructed in 1992 with a total structure width of 150 feet and a pier at the center of the structure. The current structure traverses over a roadway with a width to accommodate two 12' lanes, a 10' wide outside shoulder, and 6' to 10' wide inside shoulder in both the northbound and southbound directions (Exhibit 1). A concrete barrier is located in the median and the slope paving is located on the outside. The existing minimum vertical clearance for B-44-124 is shown in Table 1, based on FDM 11-35-1 Attachment 1.8.

Table 1 – Vertical Clearance B-44-124

Existing Vertical Clearance*	Minimum Vertical Clearance	Desirable Vertical Clearance
16'-7"	16'-4"	16'-9"

*Existing vertical clearance information specified on Wisconsin Department of Transportation Bureau of Structures Highway Structures Information (HSI) site.

Options to Expand WIS 441 With Existing Structure

Exhibit 2 shows the plan view of B-44-124 with the proposed lanes configuration detailed in Exhibit 4. Exhibit 3 through Exhibit 6 shows the proposed typical section for WIS 441 underneath the existing structure for the Fox River Valley railroad. The proposed lane configuration for WIS 441 southbound consists of three 12-foot thru lanes and two 12-foot shoulders with a barrier on the edge of the shoulders, resulting in a clear roadway width of 60 feet. The proposed lane configuration for WIS 441 northbound is detailed in Table 2. For the proposed typical section to fit underneath the existing B-44-124, a retaining

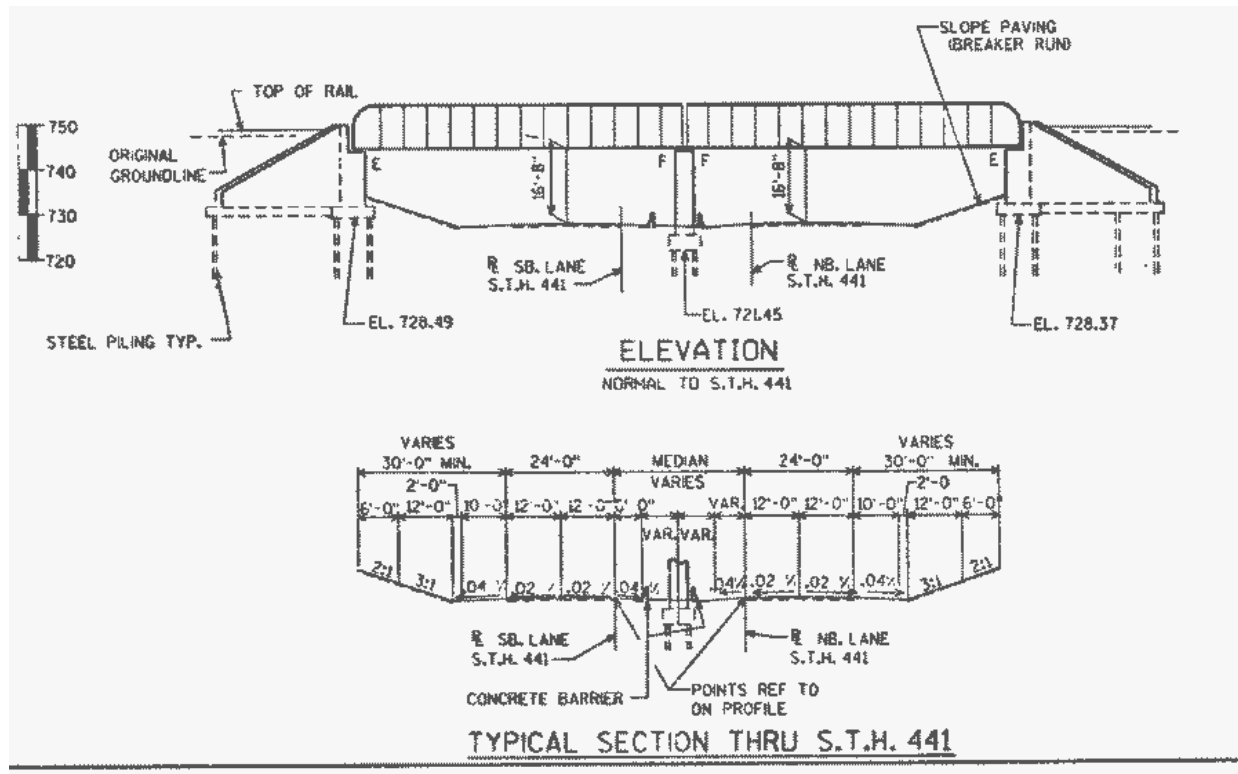
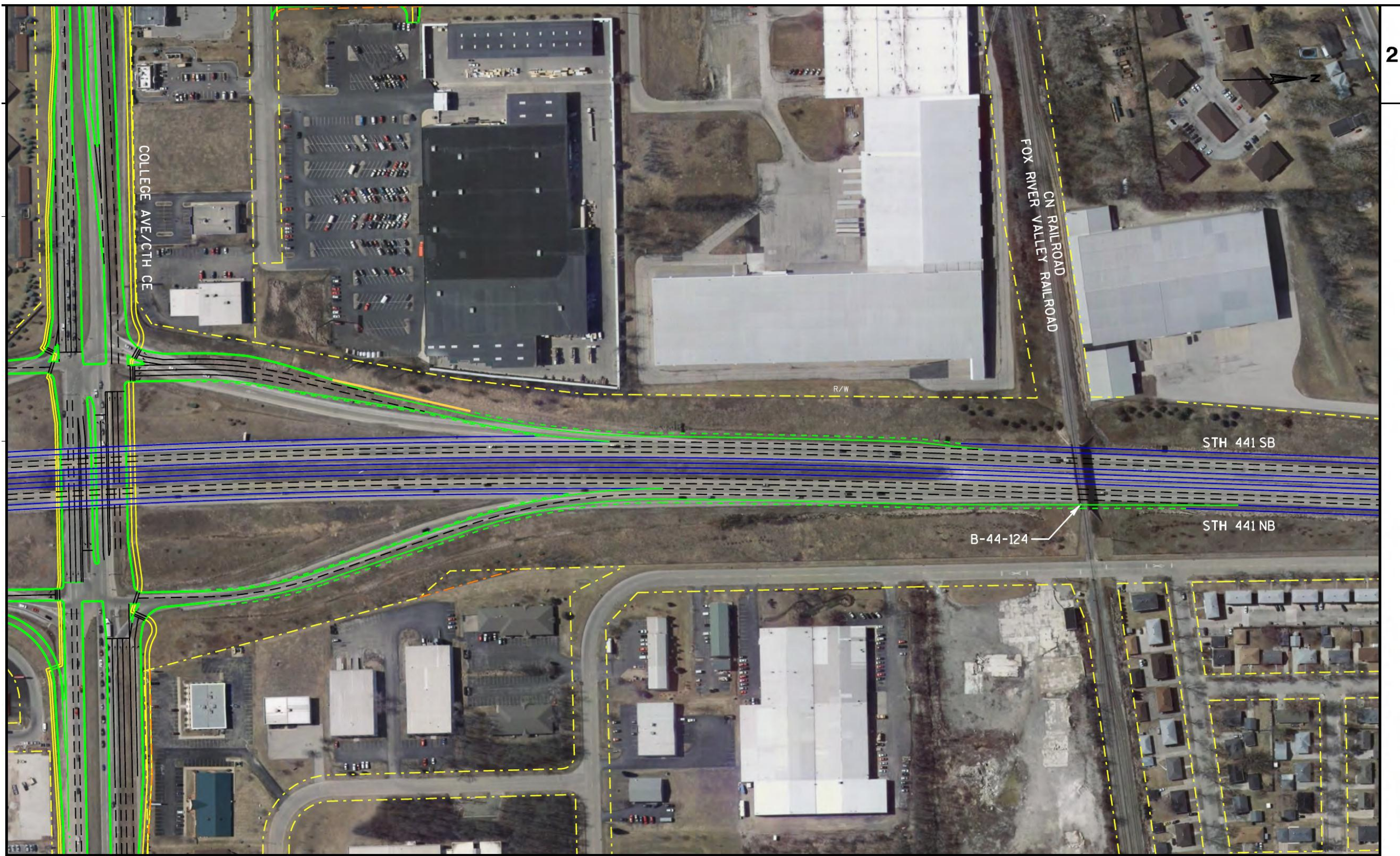


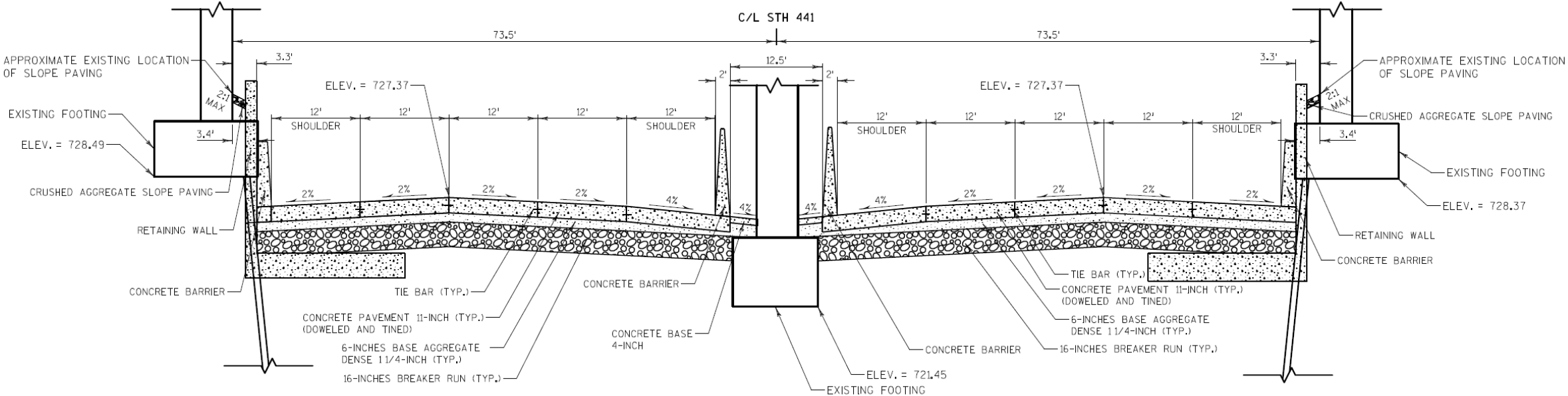
Exhibit 1 – Existing Typical Section B-44-124



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PROJECT NO:1130-31-00	HWY: STH 441	COUNTY:OUTAGAMIE	EXHIBIT 2 - PLAN VIEW B-44-124	SHEET	E
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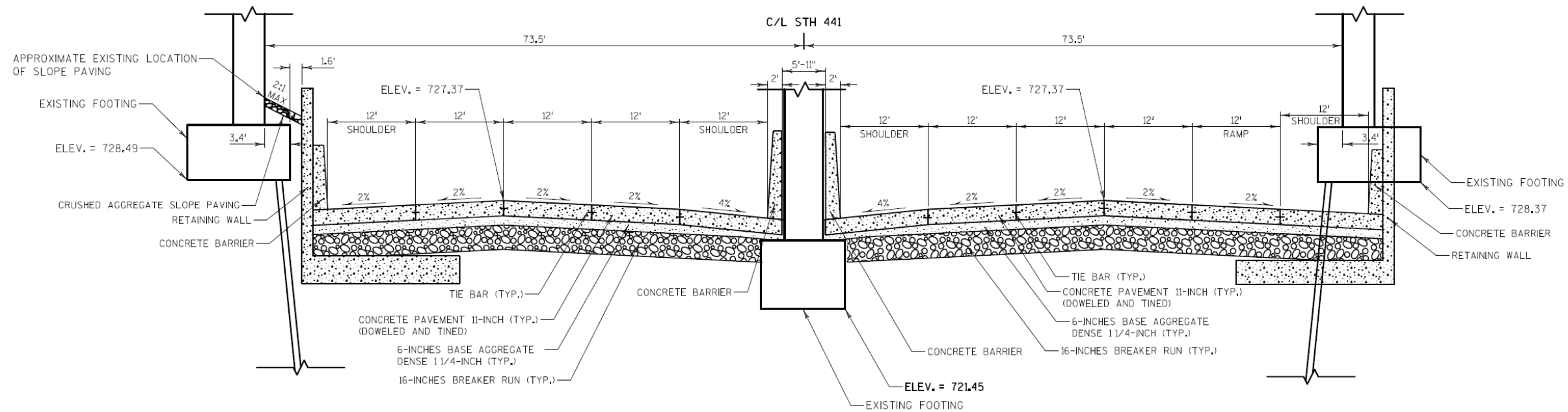
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TYPICAL FINISHED SECTION
STH 441

FOX RIVER VALLEY RAILROAD CROSSING (B-44-124)

PROJECT NO: 1130-31-00	HWY: STH 441	COUNTY: OUTAGAMIE	EXHIBIT 3 - TYPICAL SECTION	SHEET	E
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STHDOT/CADDs SHEET 42					



TYPICAL FINISHED SECTION
STH 441

FOX RIVER VALLEY RAILROAD CROSSING (B-44-124)

PROJECT NO:1130-31-00	HWY:STH 441	COUNTY:OUTAGAMIE	EXHIBIT 4 - TYPICAL SECTION	SHEET	E
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STH 441/CAADS SHEET 42

wall is needed on the outside of the roadway to stabilize the existing slope paving and provide support for the existing bridge footing. To match the adjacent USH 10/WIS 441 Corridor Project, the proposed pavement structure consists of 11-inch concrete pavement, 6 inches of base aggregate dense 1 ¼-inch, and 16 inches of breaker run.

Table 2 – WIS 441 Northbound Lane Configuration

Exhibit Number	Median Width	Thru Lane	Shoulders	Ramp	Clear Roadway Width
Exhibit 3	12'-6"	Three 12-foot Lanes	Two 12-foot Shoulders	One 12-foot Lane	72 Feet
Exhibit 4	5'-11"	Three 12-foot Lanes	Two 12-foot Shoulders	One 12-foot Lane	72 Feet
Exhibit 5	5'-11"	Three 12-foot Lanes	Two 12-foot Shoulders	N/A	60 Feet
Exhibit 6	5'-11"	Three 12-foot Lanes	Two 6-foot Shoulders	One 12-foot Lane	60 Feet

Exhibit 3 shows the proposed typical section for WIS 441 under B-44-124 with the inside concrete barrier located 6 inches outside the limits of the existing center footing. The location of the median barrier allows for the proper working width and width for zone of intrusion; reduces the risk of cracking in the concrete pavement due to different settling rates if the roadway is placed over the existing footing; and additional cover over existing footing. The proposed location of the median barrier pushes the barrier and retaining wall on the outside shoulder into the footings of the existing abutments. Therefore, Exhibit 3 as proposed cannot be used in conjunction with the existing B-44-124 structure.

Exhibit 4 shows the proposed typical section for WIS 441 under B-44-124 with the inside concrete barrier located 4 inches from the face of the existing center pier. The location of the median barrier allows for the proper working width and width for zone of intrusion; increases the risk of cracking in the concrete pavement due to different settling rates since the roadway is placed over the existing footing; and exposes the existing shallow footings during construction. There is approximately two feet between the top of the existing center footing and the finished ground line. The proposed location of the median barrier pushes the barrier and retaining wall on the outside shoulder into the footings of the existing abutments. Therefore, Exhibit 4 as proposed cannot be used in conjunction with the existing B-44-124 structure.

Exhibit 5 is similar to Exhibit 4; however, the lane configuration for WIS 441 Northbound is different, see Table 2. The ramp configuration for the College Ave/CTH CE interchange has been modified so the northbound entrance ramp to WIS 441 has ended prior to B-44-124, which allows for desirable lane and shoulder widths underneath the existing B-44-124. However, the ramp design may use minimum design criteria instead of desirable or need to be a single lane ramp. Temporary shoring, such as soil nailing, will be needed to construct the proposed retaining wall underneath B-44-124. The temporary shoring design will need to be coordinated and approved by the CN Railroad. In addition, the design of the retaining wall will be unique due to the existing footing and pile locations. Therefore, Exhibit 5 as proposed can be used in conjunction with the existing B-44-124, but is dependent on coordination with the CN Railroad and the ramp configuration.



PROJECT NO: 1130-31-00	HWY: STH 441	COUNTY: OUTAGAMIE	EXHIBIT 5 - TYPICAL SECTION	SHEET	E
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Exhibit 6 is similar to Exhibit 4; however, the lane configuration for WIS 441 Northbound is different, see Table 2. The ramp configuration for the College Ave/CTH CE interchange extends underneath B-44-124; however, to fit within the limits of B-44-124, the shoulder widths are reduced to 6 feet. Based on FDM 11-15-1, the minimum shoulder width for a freeway is 10 feet. Since the proposed shoulder width is below the minimum design criteria an Exception to Standards Report would need to be approved. Temporary shoring, such as soil nailing, will be needed to construct the proposed retaining wall underneath B-44-124. The temporary shoring design will need to be coordinated and approved by the CN Railroad. In addition, the design of the retaining wall will be unique due to the existing footing and pile locations. Therefore, Exhibit 6 as proposed can be used in conjunction with the existing B-44-124, but is dependent on an Exception to Standards Report and coordination with the CN Railroad.

The preferred alternative is to accommodate the desired roadway width accommodating the entrance ramp from College Ave/ CTH CE, detailed in Exhibit 4. Therefore, a new structure must be constructed to replace the current B-44-124 structure. The new structure would accommodate three 12-foot thru lanes and two 12-foot shoulders in the southbound direction. In the northbound direction the width under the structure would accommodate three 12-foot thru lanes, two 12-foot shoulders, and one 12-foot ramp lane. By replacing the B-44-124 with a new structure, standard design and construction practices can be used instead of having unique retaining wall design and temporary shoring to fit the existing conditions. Due to the increased structure length, a large girder may be needed; therefore, the vertical profile of the roadway will need to be lowered to obtain the desirable vertical clearance of 16'9".



FOX RIVER VALLEY RAILROAD CROSSING (B-44-124)

Replacement Options

The existing rail's timetable speed is 10 miles per hour, with approximately 6 trains per day. With this level of activity anticipated, the following three options are available:

Option No. 1 – Temporary Shoo-fly bridge and On-alignment Replacement

- Propose temporary bridge approximately 50' south of the existing bridge in attempt to avoid flagging requirements during construction
- Temporarily realign the mainline track with two (2) or four (4) degree curves across the temporary bridge. The two (2) siding tracks east need to be reconnected to maintain access and storage of rail cars during construction.
- Existing bridge would be replaced on same alignment and to span the necessary roadway improvements.
- Existing siding tracks east would be replaced to previous configuration after bridge construction is complete

Option No. 2 – Permanent Bridge Replacement on Offset Alignment

- Propose permanent bridge approximately 50' south of the existing bridge in attempt to avoid flagging requirements during construction
- Permanent bridge would span the necessary roadway improvements.
- Permanently realign the mainline track with two (2) or four (4) degree curves across the temporary bridge. The two (2) siding tracks east need to be reconfigured to maintain access and storage of rail cars during construction.
 - o Adding additional capacity to the siding tracks may be necessary to fully compensate the railroad due to the new alignment configuration. This can be negotiated with the railroad at a later phase.

Option No. 3 – Under Traffic and in-line construction

- Propose bridge replacement would occur on the existing alignment and under traffic.
- The proposed inline bridge would span the necessary roadway improvements.
- Construction would take place during designated work windows and track outages and utilize “jump” spans to maintain the track in service during construction.

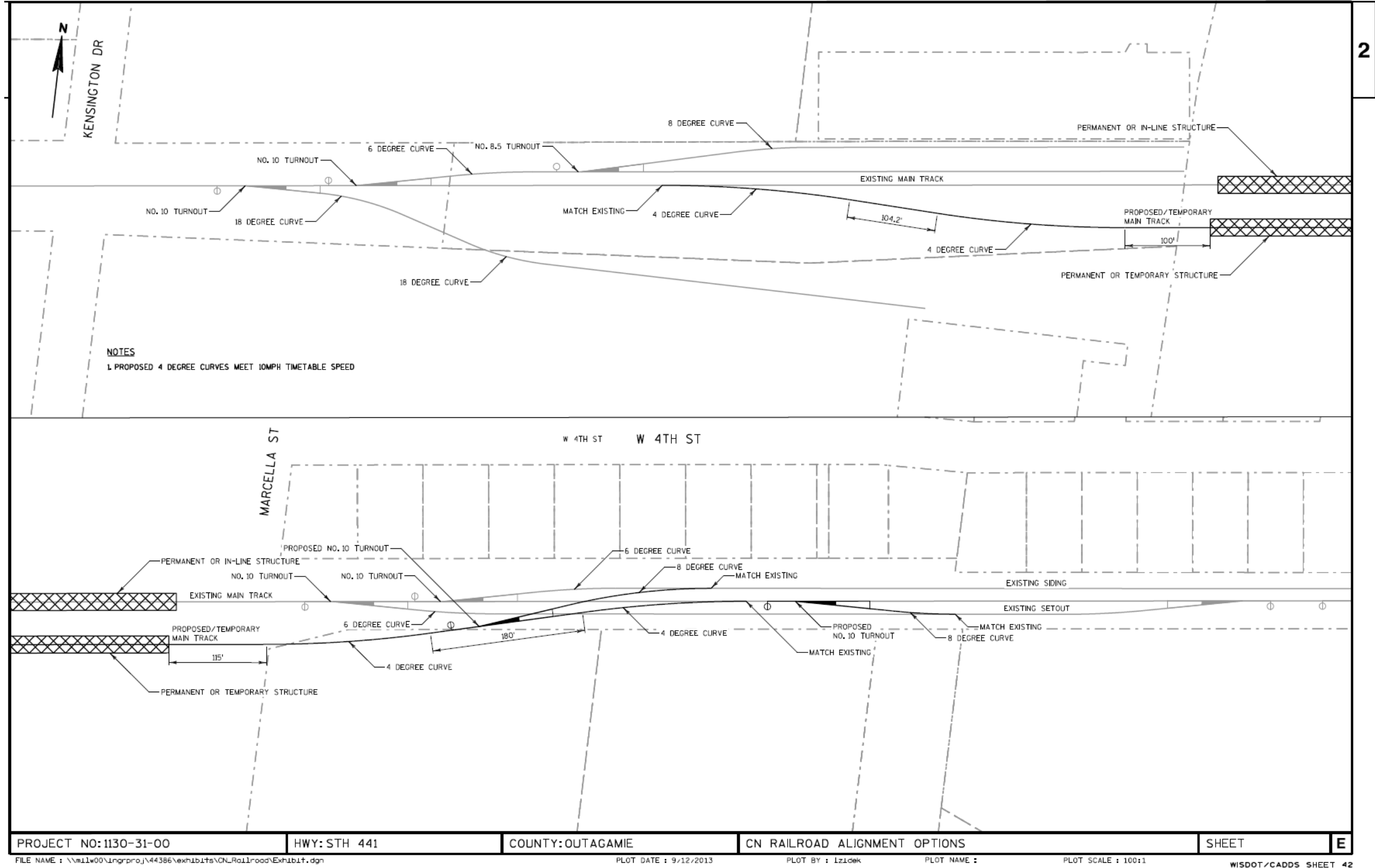


Exhibit 7 – Replacement Options