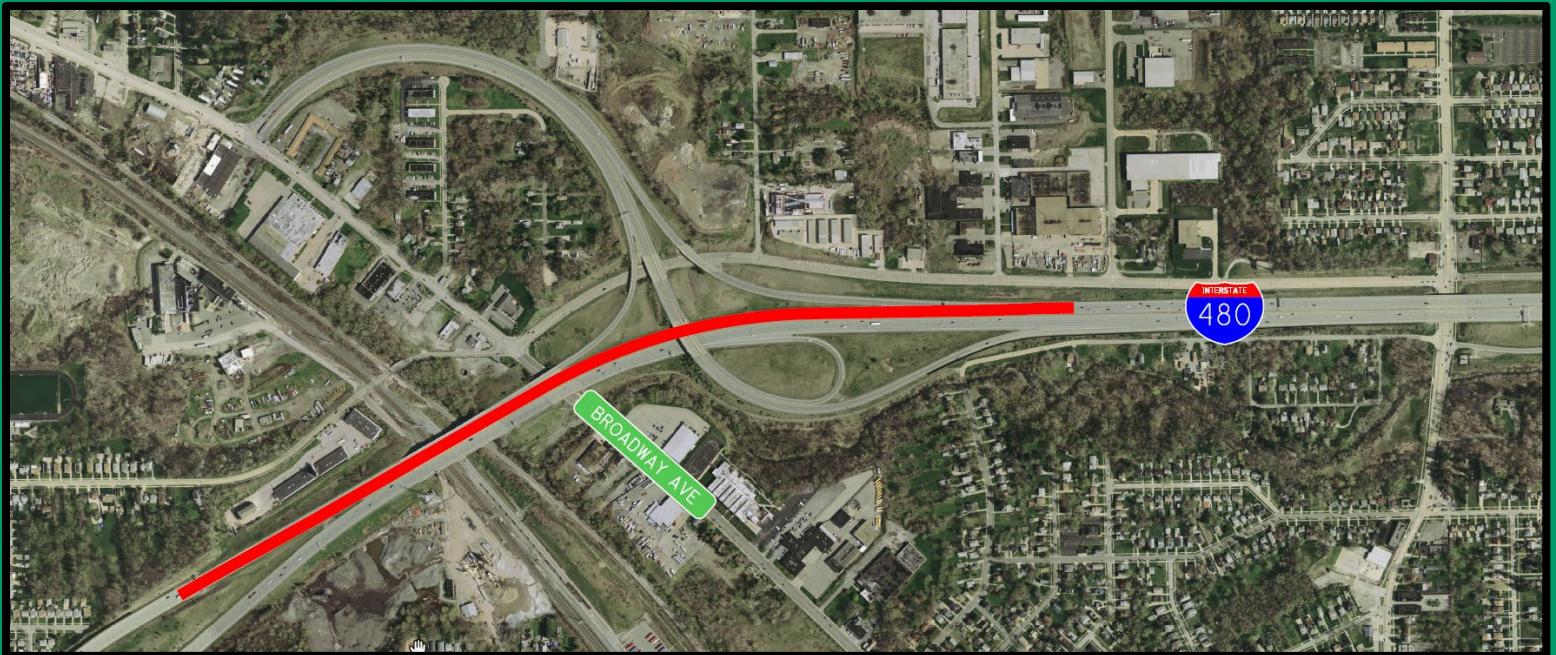


IR-480 & BROADWAY

STUDY FOR 4TH LANE WB ON IR-480

Technical Memo

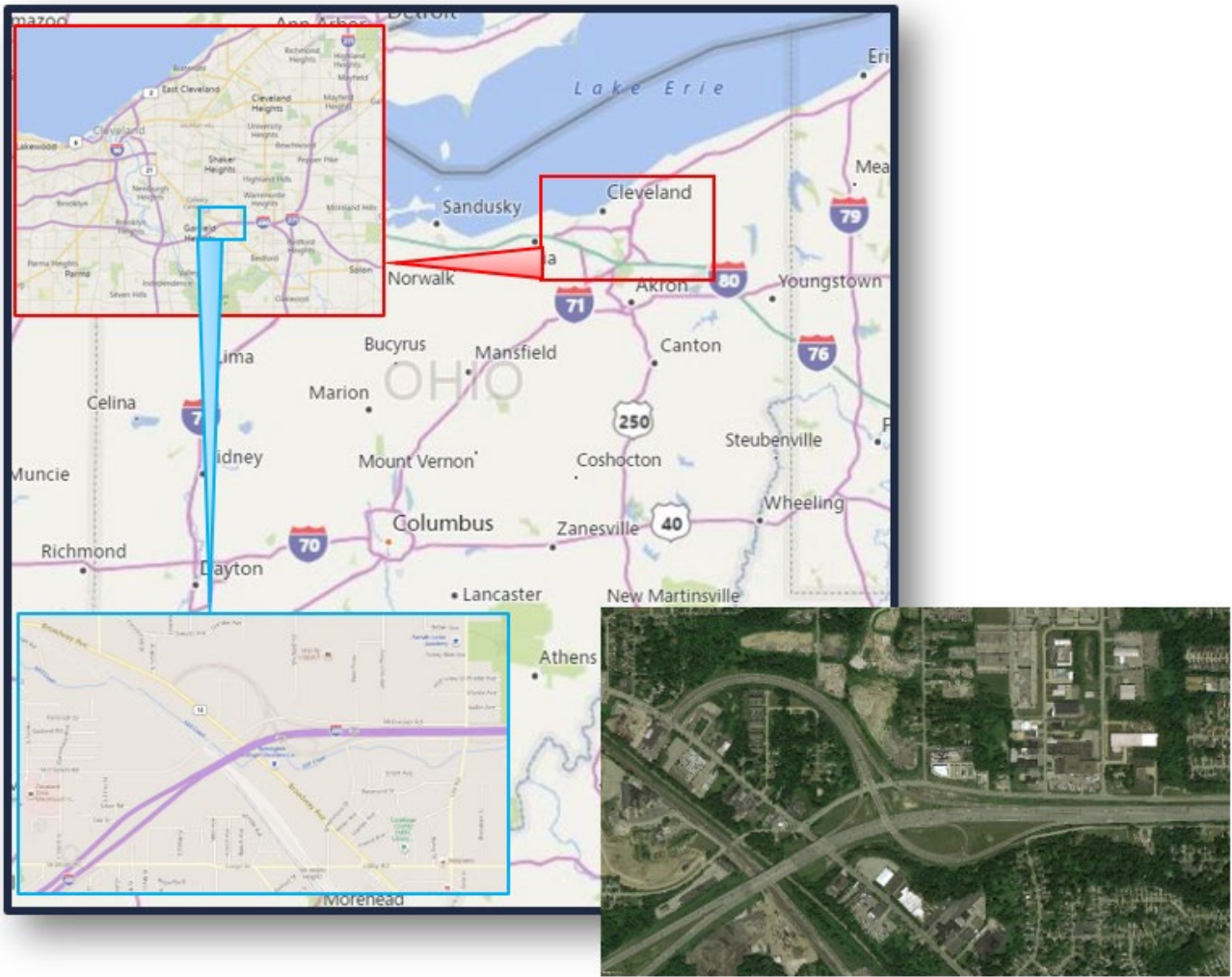
CUY-480-21.30 / PID 107657



Submitted to ODOT D12
February 2019

LOCATION MAP

Cuyahoga County, IR-480 and Broadway Ave



PROJECT DESCRIPTION

ODOT District 12 asked Gannett Fleming (GF), as part of the Task Order Contract with D3/D12, to assist with evaluating the potential for a 4th travel lane westbound through the IR-480 & Broadway Interchange. The project is located at the IR-480 and Broadway interchange, beginning at the WB exit ramp to Broadway Avenue, and terminates approximately 1,500' west of the railroad bridge overpass.

The goals of the study were to identify low cost/low impact - feasible lane configurations, associated impacts to 3 bridges, merge and diverge areas, and potential design exceptions needed to limit the overall expansion of the roadway pavement. No formal traffic analysis was completed as part of this study.

CONSTRAINTS AND DESIGN CRITERIA

The following design elements were key factors during the decision-making process in selecting the Recommended Alternative:

- Superelevation and crown correction
- Drainage considerations
- Impacts to median barrier
- Roadway and bridge widening
- Lane and shoulder widths
- Design exceptions

These elements will be discussed in more detail in the Alternatives Considered Section of this memo.

ALTERNATIVES CONSIDERED

Three alternatives were considered for this project. Each of the alternatives considered were investigated at a planning level to initially evaluate impacts and design implications. As part of the lane addition, the WB IR-480 exit ramp to Broadway Avenue will be converted from a two-lane ramp to a single lane ramp. The new single lane WB IR-480 exit ramp will then join up with the EB IR-480 exit ramp to Broadway Avenue to match the existing combined two-lane (IR-480 EB & WB) exit ramp section to Broadway Avenue. This eliminates the merge condition where the 2 ramps currently meet, and the WB IR-480 ramp goes from 2 lanes to 1 lane.

Plan layouts for all three alternatives are listed in **Figures 1-3**, and the typical sections are shown in **Figure 4**. For all three alternatives, there are three 11' lanes and one 12' lane, with the 12' lane being the thru lane adjacent to the median barrier.

The existing roadway drainage system consists of median inlets and catch basins in the roadside ditch which are connected by pipes running under IR-480. This system ultimately releases into Mill Creek to the south of the site. Given the existing median drainage system, it was calculated that the average spread for this stretch of IR-480 is approximately 9'. For the spread to not encroach into the inside travel lane, a minimum of 9' wide median shoulder would be required, assuming no upgrades are made to the existing median drainage system.

Alternative 1: 4' Median Shoulder Width (Figures 1 & 4)

- Lane and shoulder widths: 7.5' outside shoulder/three 11' lanes/12' lane/4' median shoulder.
- Superelevation and crown correction: Variable depth asphalt on roadway, concrete on bridge decks.
- Drainage considerations: Will require additional inlets along median barrier for spread. Per ODOT D12's recommendation, the exact number of additional inlets for this alternative was not investigated; however, with a narrower median shoulder width than Alternative 2, even more inlets will be required to limit spread when compared to Alternative 2.
- Impacts to median barrier: Will require replacement of sections to install new inlets. The exact median barrier impact for Alternative 1 was not investigated but would be similar to Alternative 2.
- Roadway and bridge widening: None.
- Design exceptions: Shoulder and lane widths (NDC: Inside Shoulder - 10'; Lane Width - 12': Outside Shoulder - 10').

Alternative 2: 5.5' Median Shoulder Width (Figures 2 & 4)

- Lane and shoulder widths: 6' outside shoulder/three 11' lanes/12' lane/5.5' median shoulder.
- Superelevation and crown correction: Variable depth asphalt on roadway, concrete on bridge decks.
- Drainage considerations: Will require approximately 7 additional inlets and 1,900' of 15" pipe along median barrier for spread. These inlets would be connected under the median barrier with no additional proposed pipe crossings under IR-480.
- Impacts to median barrier: Will require approximately 1,900' of median barrier be replaced to install new inlets.
- Roadway and bridge widening: No roadway widening. 3' bridge widening (over existing railroad).
- Design exceptions: Shoulder and lane widths (NDC: Inside Shoulder - 10'; Lane Width - 12': Outside Shoulder - 10').

Alternative 3: Maintain Existing Median Shoulder Width (Figures 3 & 4)

- Lane/shoulder widths: 10' outside shoulder/three 11' lanes/12' lane/10.5' (existing) median shoulder.
- Superelevation and crown correction: Variable depth asphalt on roadway, concrete on bridge decks.
- Drainage considerations: No additional inlets along median barrier. Minor ditch regrading along outside shoulder to accommodate roadway widening, and relocation of catch basins.
- Impacts to median barrier: No impact to existing median barrier.
- Roadway and bridge widening: 8' roadway widening. 6.5' bridge widening (over existing railroad).
- Design exceptions: Lane widths (NDC: Lane Width - 12').

RECOMMENDED ALTERNATIVE

After discussions with ODOT D12 staff, it was agreed upon that the Recommended Alternative for this project would be a **modified version** of Alternative 2, utilizing a 6' wide median shoulder instead of the originally proposed 5.5' shoulder. This alternative provided an acceptable balance between roadway and drainage impacts when compared to the other alternatives. The only required widening is three additional feet of bridge width over the railroad. Additional median drainage and impact to the barrier wall is required due to the median shoulder being reduced below 9'. To avoid impacts to the median drainage system, four additional feet of road widening and approximately three additional feet of bridge widening would be required.

An Opinion of Probable Construction Cost and Final Exhibit (**Figure 5**) was generated and submitted to ODOT in December 2018. In doing so, it was noted from existing plans that both the existing median and outside shoulders were not full depth. As a result of this finding, as well as the need to install additional median inlets, the existing shoulders (Median & Outside) were estimated for full depth pavement replacement.

NEXT STEPS

After receipt of this Memo, its anticipated that the next steps could include the following:

- Interchange Operations Study
- Confirmation of required design exceptions
- Further design development



FIGURE 1

CALCULATED
DLR
CHECKED

0 175 350
HORIZONTAL
SCALE IN FEET

**ADDITON OF 4TH LANE ON 480 WB
4' MEDIAN SHOULDER WIDTH**

CUY - 480 - 21.30



FIGURE 2

CALCULATED	0	175	350
DLR	HORIZONTAL SCALE IN FEET		
CHECKED			

ADDITON OF 4TH LANE ON 480 WB
5.5' MEDIAN SHOULDER WIDTH

CUY - 480 - 21.30



FIGURE 3

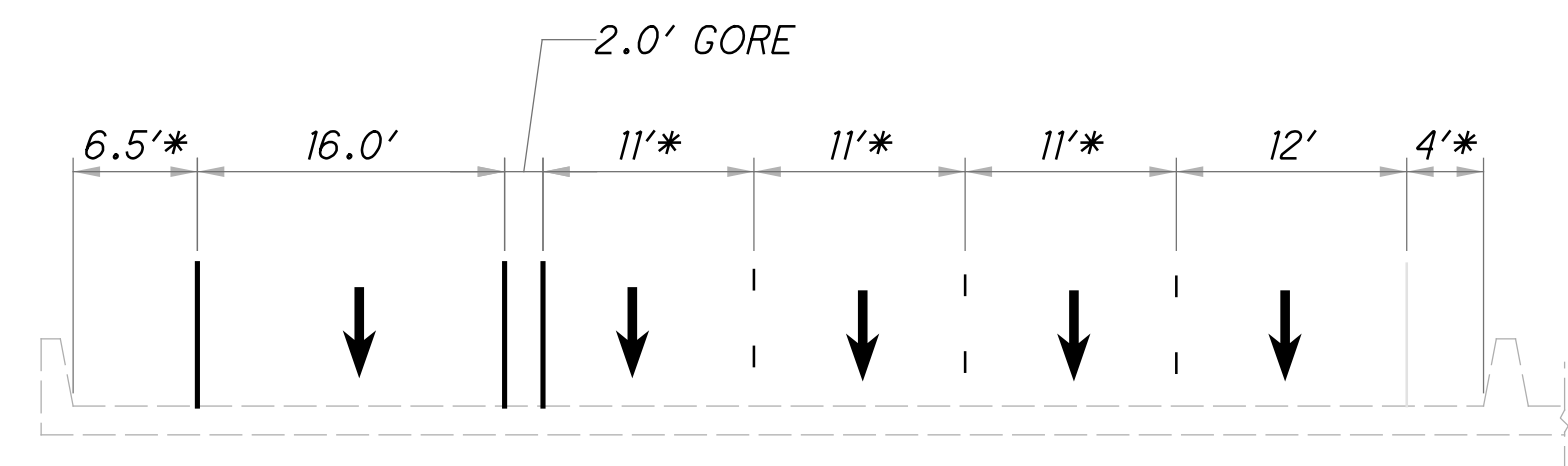
CALCULATED	DLR	CHECKED

0 175 350
HORIZONTAL SCALE IN FEET

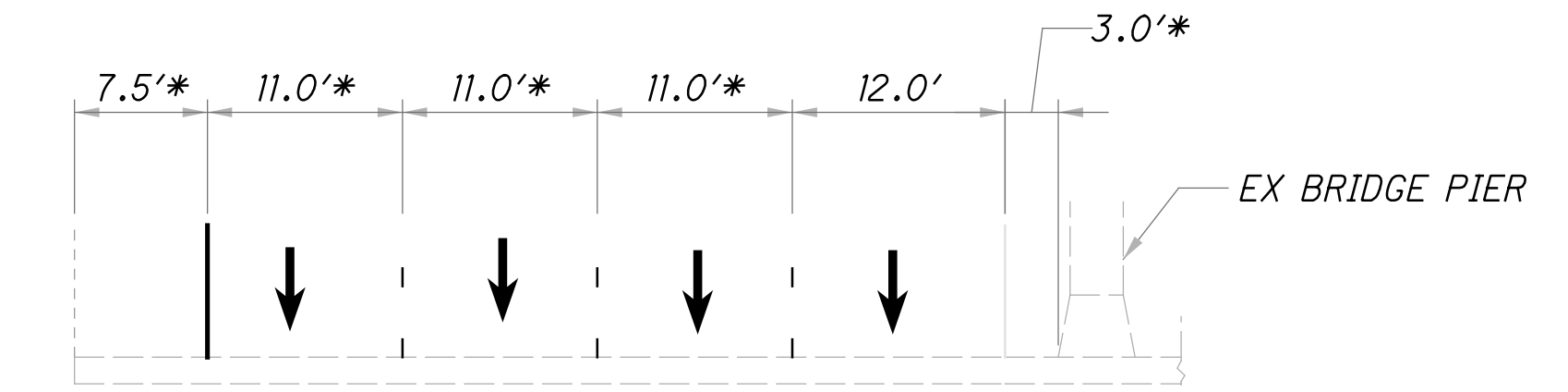
**ADDITON OF 4TH LANE ON 480 WB
MAINTAIN EXISTING MEDIAN SHOULDER WIDTH**

CUY - 480 - 21.30

4' MEDIAN SHOULDER WIDTH

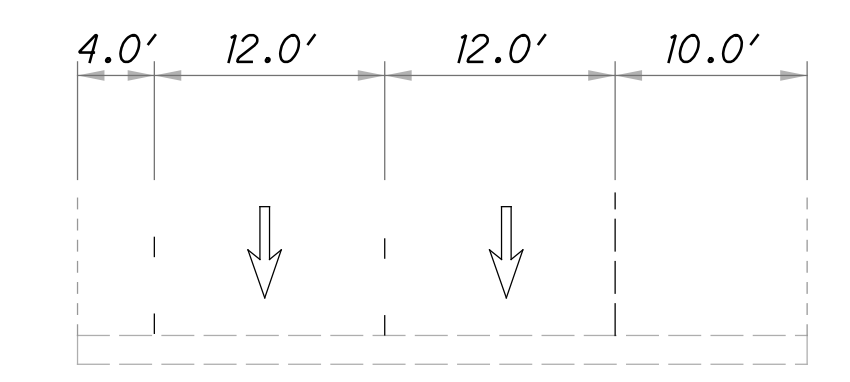


SECTION A-A

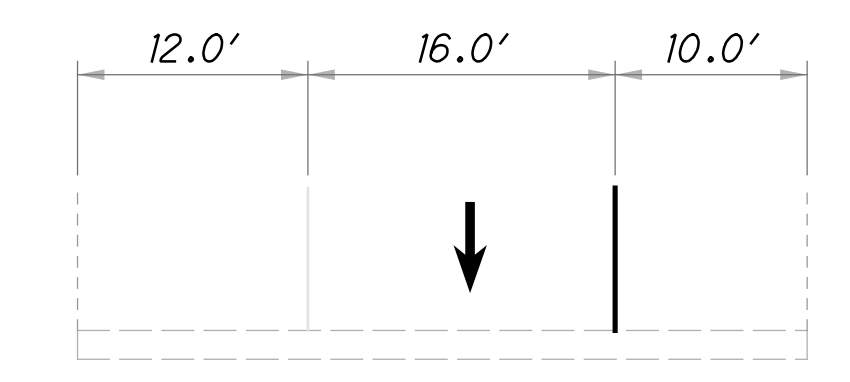


SECTION OUTSIDE BRIDGE OVERPASS

SECTION B-B



EXISTING

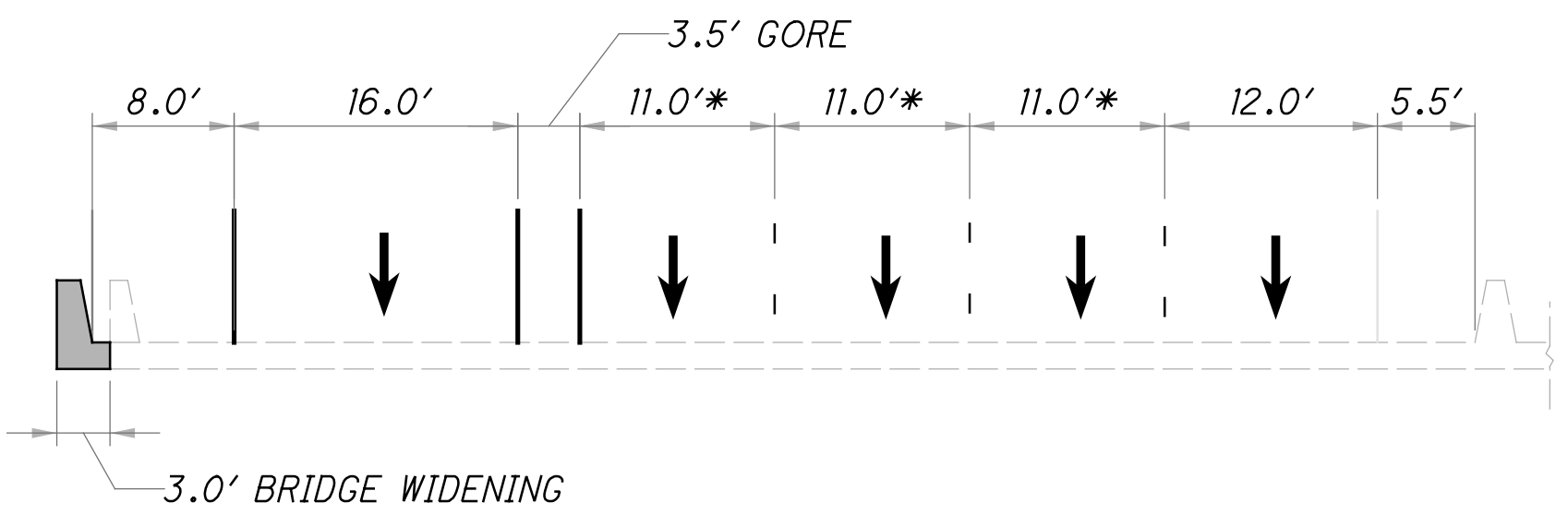


PROPOSED

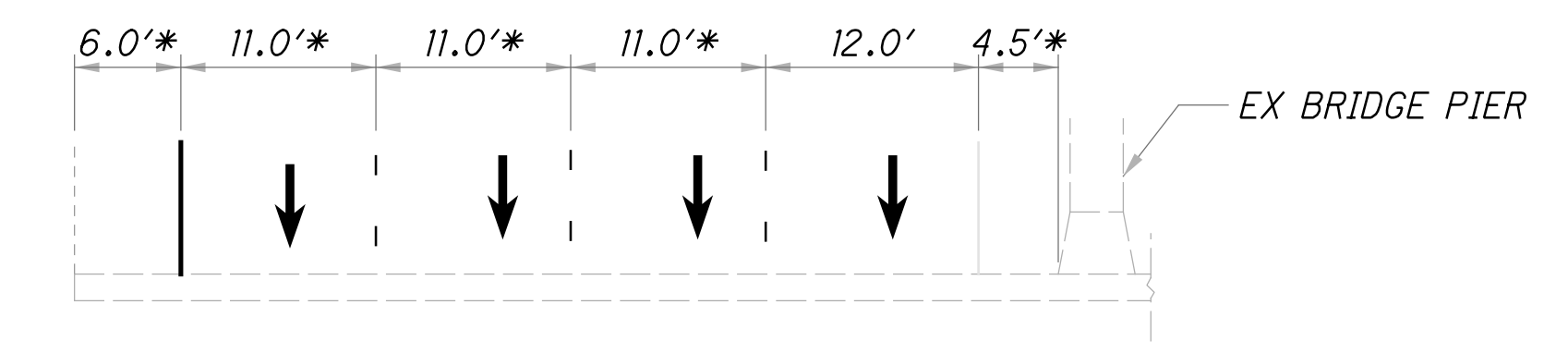
SECTION C-C

* INDICATES A DESIGN EXCEPTION WOULD BE REQUIRED

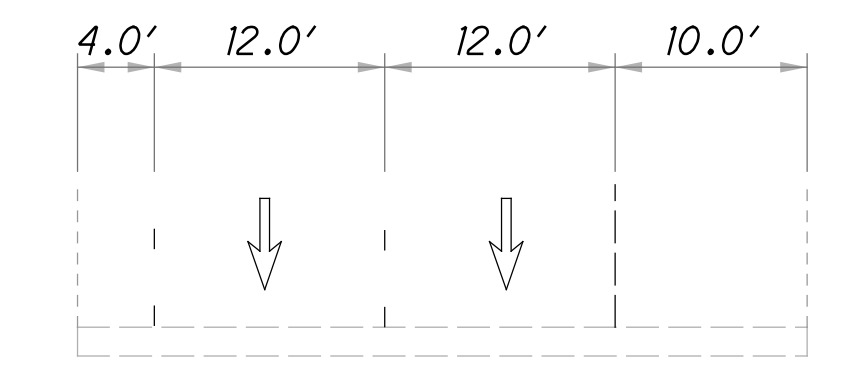
5.5' MEDIAN SHOULDER WIDTH



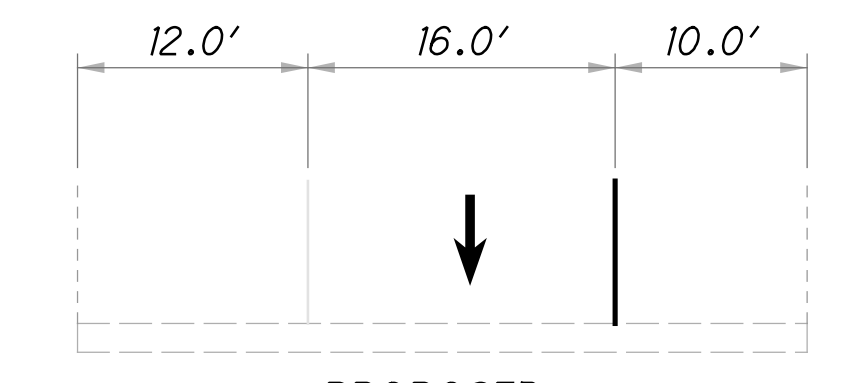
SECTION A-A



SECTION B-B



EXISTING

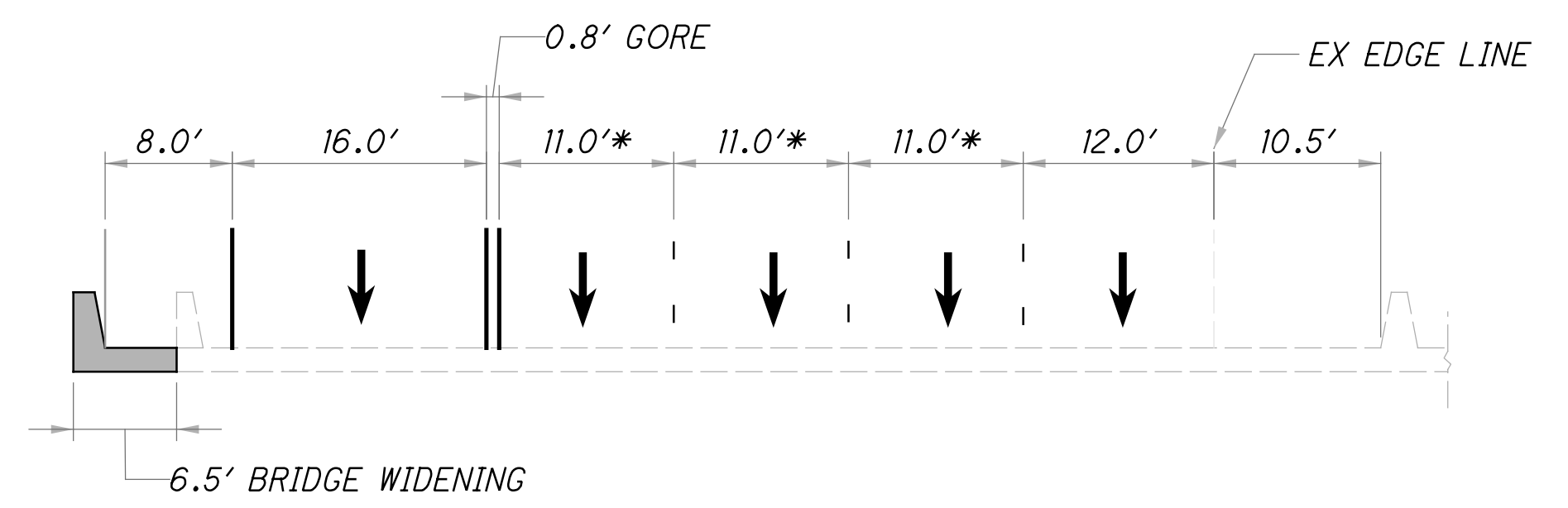


PROPOSED

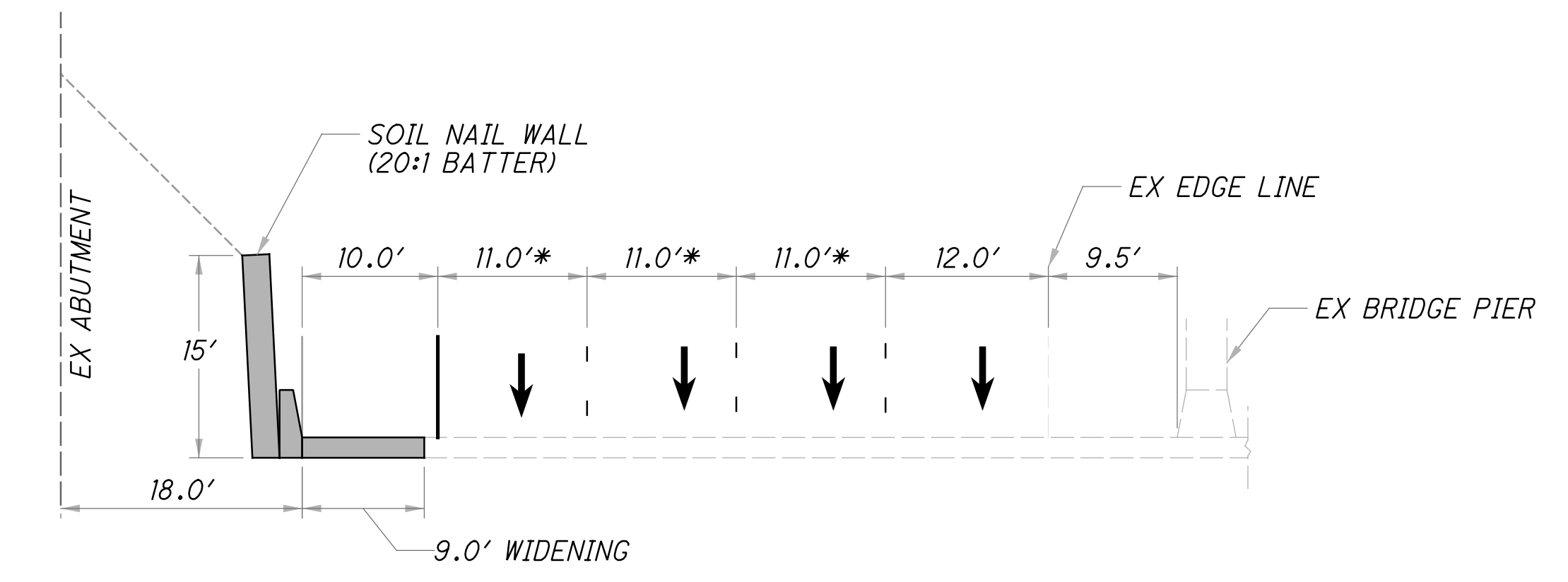
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* INDICATES A DESIGN EXCEPTION WOULD BE REQUIRED

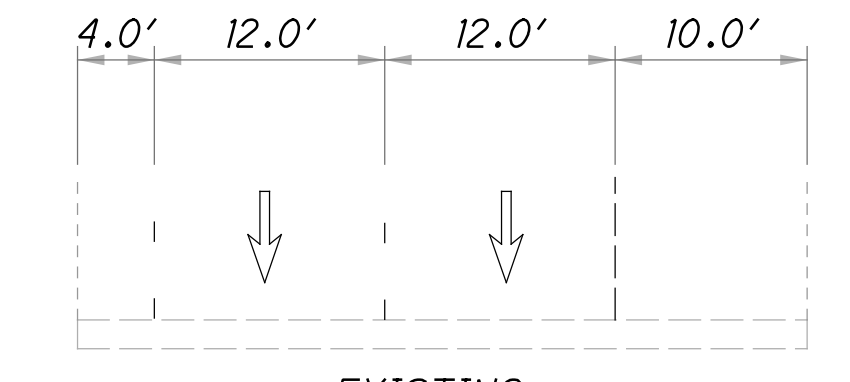
MAINTAIN EX MEDIAN WIDTH



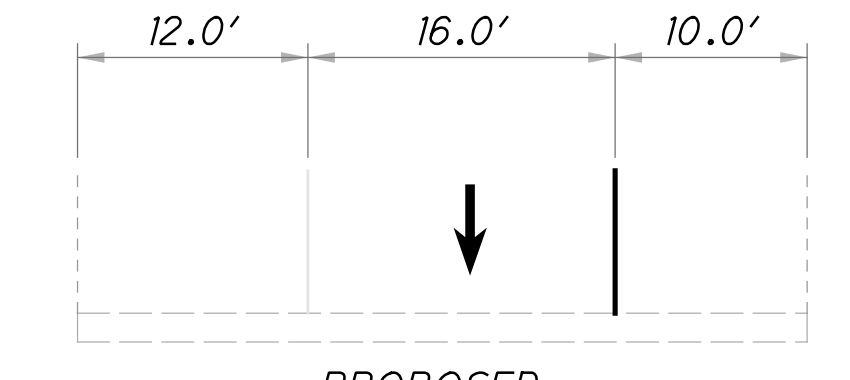
SECTION A-A



SECTION B-B



EXISTING



PROPOSED

SECTION C-C

* INDICATES A DESIGN EXCEPTION WOULD BE REQUIRED

FIGURE 4

PRELIMINARY COST ESTIMATE (CUY-480-21.30)				
DESCRIPTION	UNIT	UNIT COST	QTY	COST
ASPHALT PAVEMENT	SY	\$52	6,362	\$330,836
RESURFACING	SY	\$16	27,395	\$438,324
BARRIER INLET	EACH	\$10,000	7	\$70,000
15" TYPE B CONDUIT	FT	\$90	1,830	\$164,700
CONCRETE MEDIAN BARRIER	FT	\$110	1,880	\$206,800
BRIDGE WIDENING	SF	\$300	866	\$259,800
			SUBTOTAL	\$1,470,459
CONTINGENCY	30%			\$441,138
TRAFFIC CONTROL	%	3%		\$44,114
EROSION CONTROL	%	1%		\$14,705
BMP	%	1%		\$14,705
MOT	%	7%		\$102,932
MOBILIZATION				\$80,000
			SUBTOTAL	\$256,455
CONTINGENCY	30%			\$76,937
			TOTAL	\$2,244,988
RECOMMENDED FUNDING REQUEST				\$2,250,000

RESURFACING

FULL DEPTH PAVEMENT FOR EXISTING SHOULDER REPLACEMENT

LEGEND

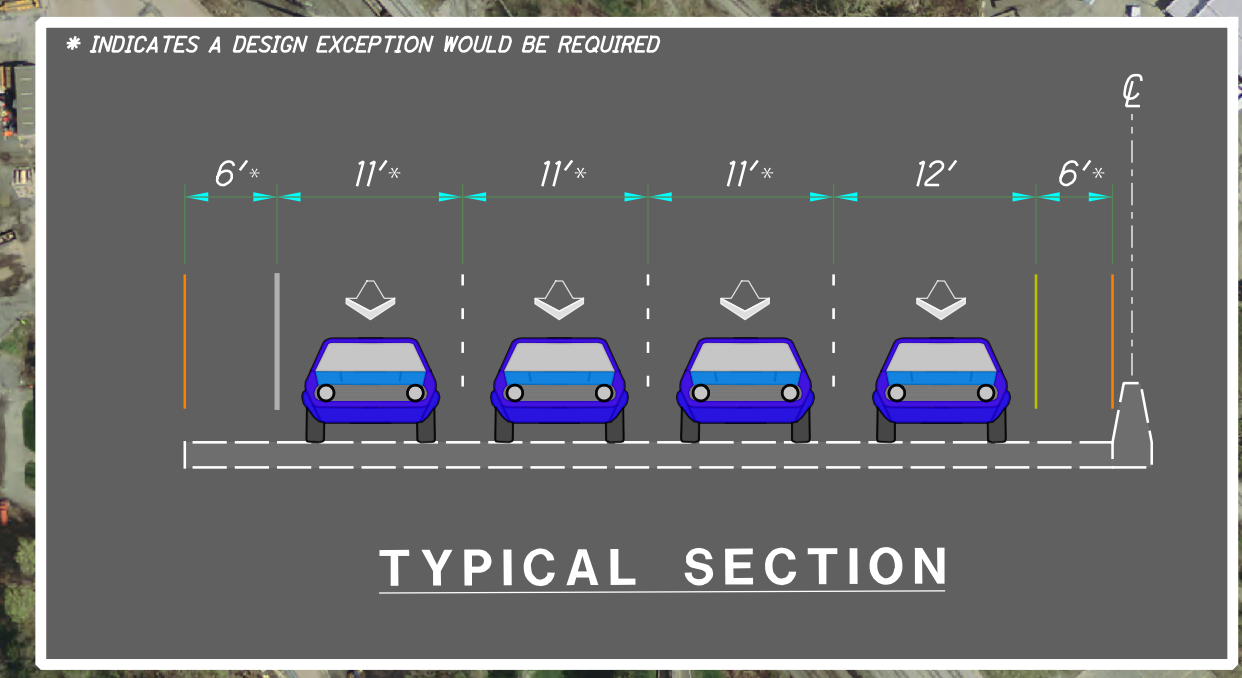
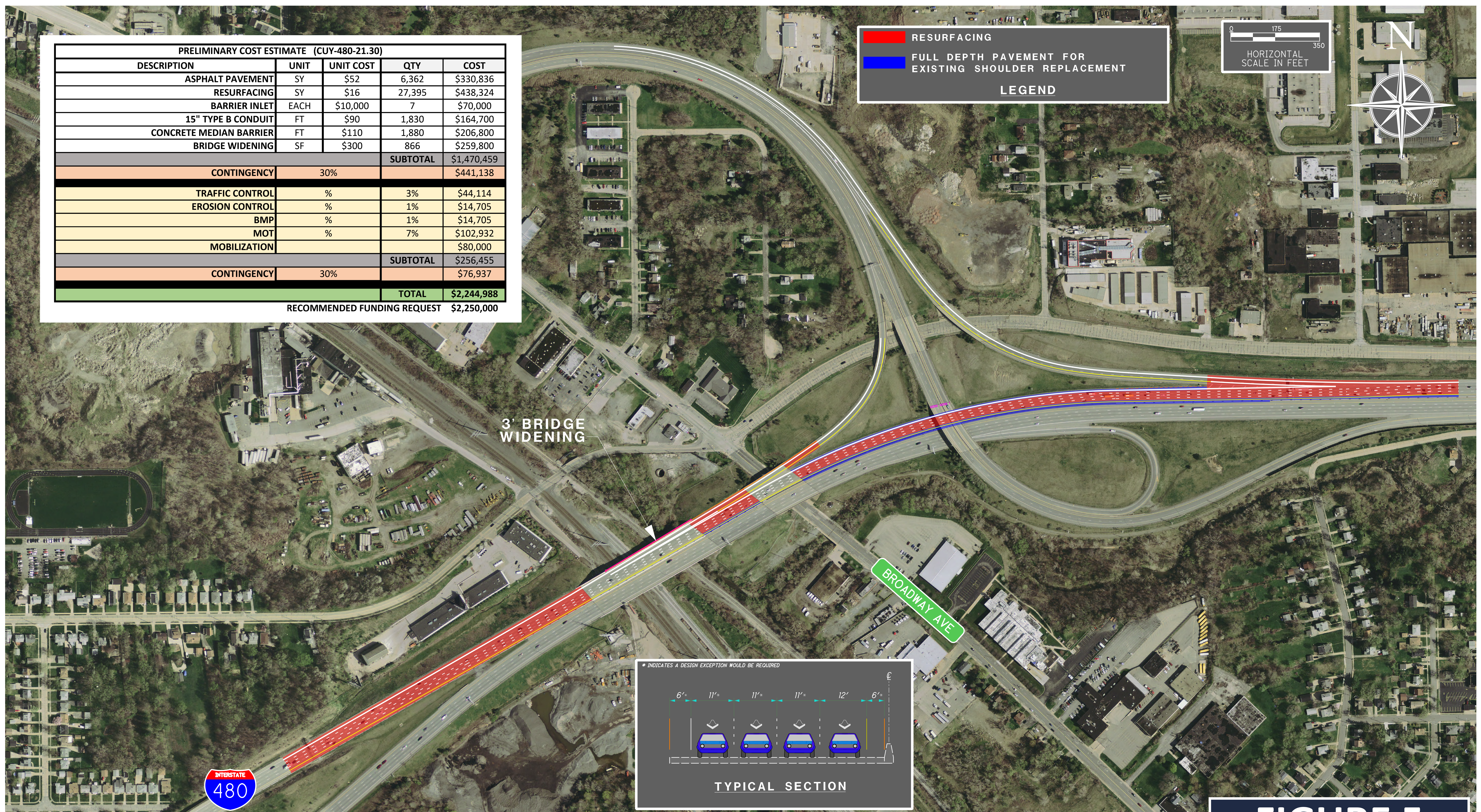
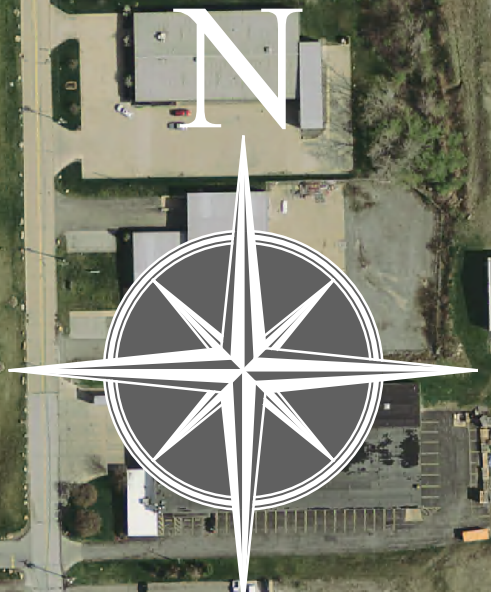
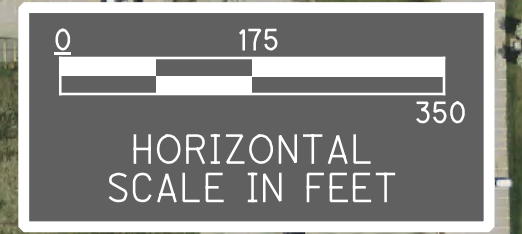


FIGURE 5



**CUY-480-21.30
DECEMBER, 2018**

**PRELIM COST ESTIMATE
6' MEDIAN SHOULDER WIDTH**