



CUY-90-14.90

PID 77332/85531

APPENDIX LD-03

**Retaining Wall Justification Studies
(Reference Document)**

State of Ohio
Department of Transportation
Jolene M. Molitoris, Director

**Innerbelt Bridge
Construction Contract Group 1 (CCG1)**

Retaining Wall Justification

I-90 WB (Stations 110+00 to 116+00)

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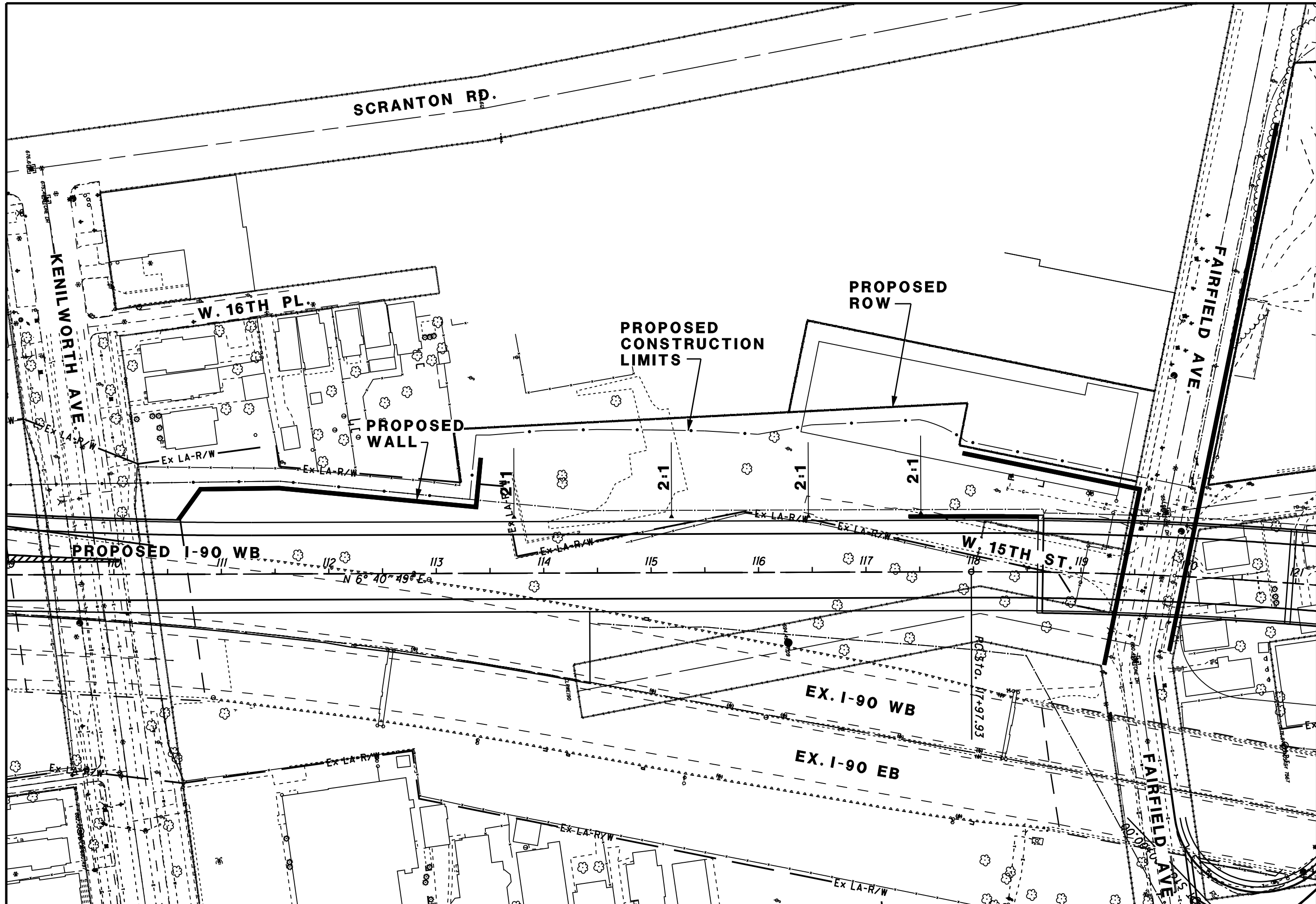
1. INTRODUCTION AND EXECUTIVE SUMMARY..... 1

2. PLAN & CROSS SECTION SHEETS

1. INTRODUCTION AND EXECUTIVE SUMMARY

Proposed I-90 westbound is new construction that extends from just south of the Starkweather Avenue overpass bridge structure to just east of the East 9th Street overpass bridge structure. This new construction is about 1.5 miles in length and is located just north or west of the existing I-90 freeway. Bridge improvements include widening of the Kenilworth Avenue overpass bridge, new 1 mile bridge from just south of Fairfield Avenue to just east of Ontario Street and a new bridge over East 9th Street. Proposed I-90 WB requires the purchase of new right-of-way and the taking of many structures.

Additional right-of-way is proposed from about station 113+30 to the new bridge near station 118+65. For this area, fill slopes can be utilized from station 113+30 to station 117+40. However, from approximately station 110+60 to about station 113+45, a proposed retaining wall is necessary in order to minimize the amount of additional right-of-way and the taking of structure(s) or parking lot(s) as shown on the plan view. This proposed wall is located on the west side of westbound I-90 and starts at the north side of the bridge widening overpass at Kenilworth Avenue and extends about 300 feet north.



SCRANTON RD.

KENILWORTH AVE.

W. 16TH PL.

PROPOSED WALL

PROPOSED CONSTRUCTION LIMITS

PROPOSED ROW

2:1

2:1

2:1

PROPOSED I-90 WB

W. 15TH ST.

EX. I-90 WB

EX. I-90 EB

FAIRFIELD AVE.

FAIRFIELD AVE.

N 6° 40' 49" E

AC 31.0. 117+97.93



0 20 40 80
HORIZONTAL SCALE IN FEET

CALCULATED
CHECKED

RETAINING WALL JUSTIFICATION STUDY
I-90 WESTBOUND (STA. 110+00 TO 116+00)

CUY-90-INNERBELT

2
6

SEEDING

END WIDTH SO. YDS.

END AREA

VOLUME

CUT FILL

CUT FILL

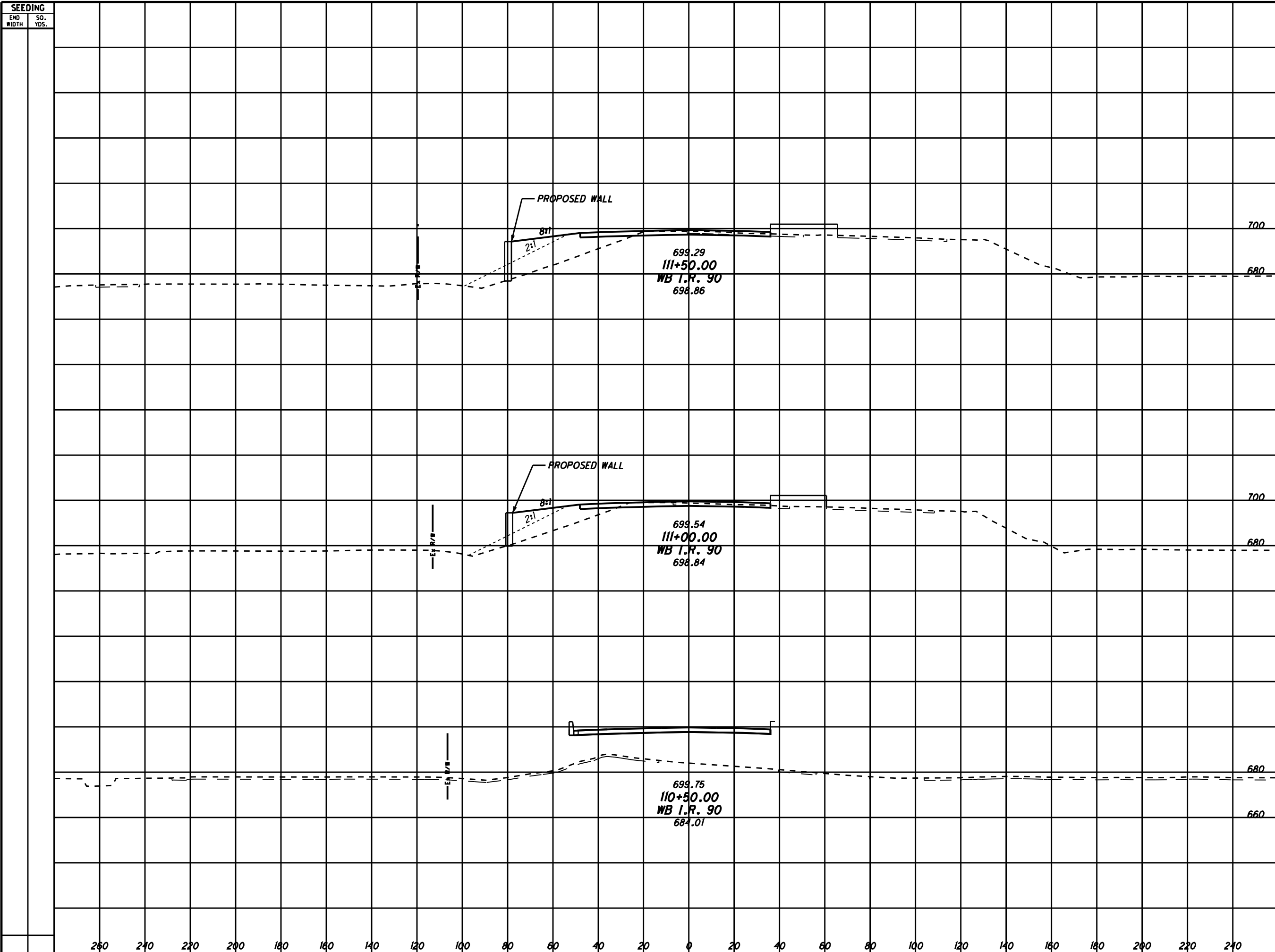
CALCULATED

CHECKED

RETAINING WALL JUSTIFICATION STUDY
I-90 WESTBOUND (STA. 110+50 TO STA. 111+50)

CUY-90-INNERBELT

3/5



700

680

700

680

680

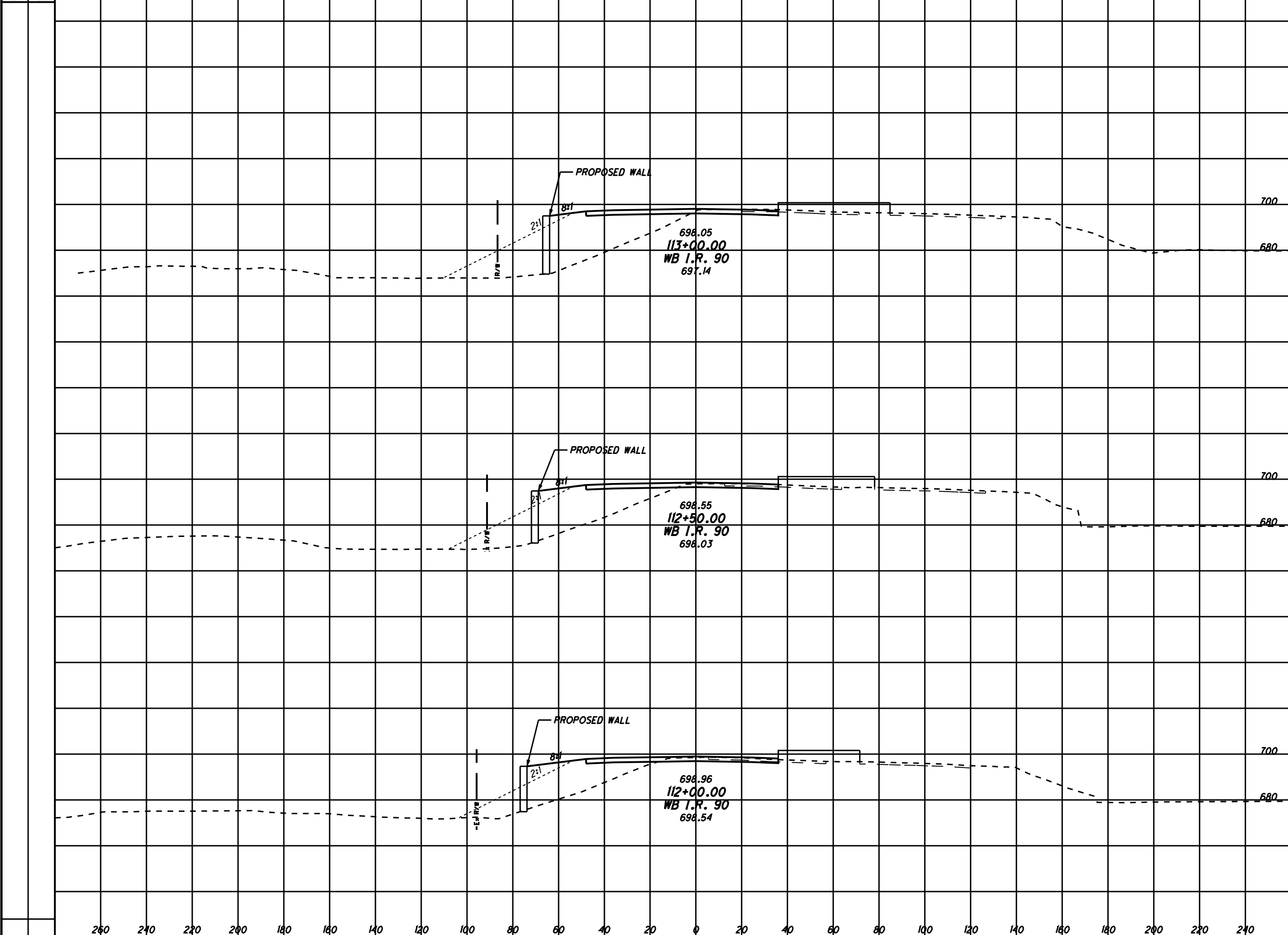
660

260 240 220 200 180 160 140 120 100 80 60 40 20 0 20 40 60 80 100 120 140 160 180 200 220 240

SEEDING
END WIDTH SO. YDS.

END AREA VOLUME
CUT FILL CUT FILL

CALCULATED
CHECKED



RETAINING WALL JUSTIFICATION STUDY
I-90 WESTBOUND (STA. 112+00 TO STA. 113+00)

CUY-90-INNERBELT

4
6

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Retaining Wall Justification

I-90 WB (Stations 116+00 to 119+00)

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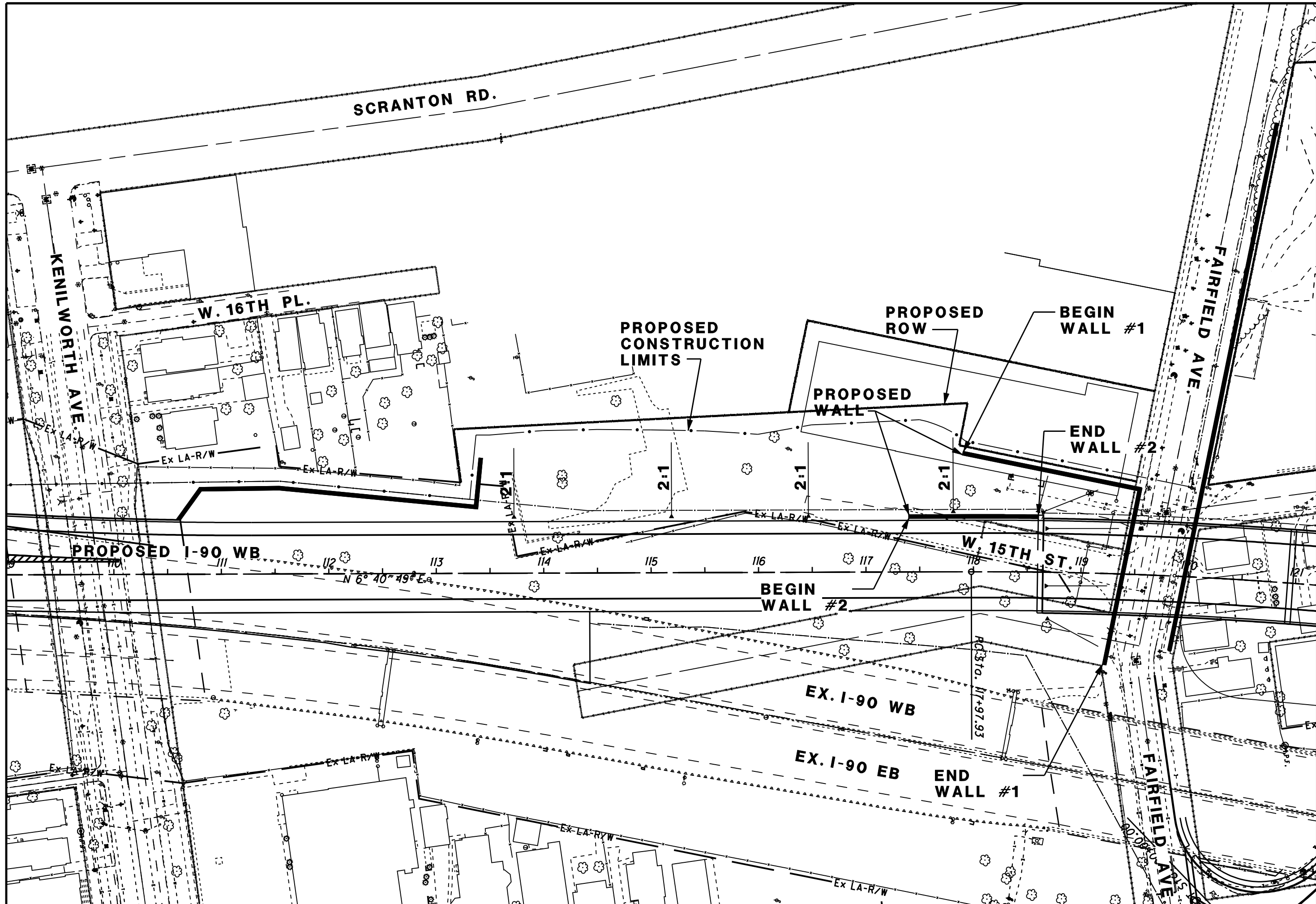
1. INTRODUCTION AND EXECUTIVE SUMMARY..... 1

2. PLAN & CROSS SECTION SHEETS

1. INTRODUCTION AND EXECUTIVE SUMMARY

Proposed I-90 westbound is new construction that extends from just south of the Starkweather Avenue overpass bridge structure to just east of the East 9th Street overpass bridge structure. This new construction is about 1.5 miles in length and is located just north or west of the existing I-90 freeway. Bridge improvements include widening of the Kenilworth Avenue overpass bridge, new 1 mile bridge from just south of Fairfield Avenue to just east of Ontario Street and a new bridge over East 9th Street. Proposed I-90 WB requires the purchase of new right-of-way and the taking of many structures.

Additional right-of-way is proposed from about station 113+30 to the new bridge near station 118+65. For this area, fill slopes can be utilized from station 113+30 to station 117+40. However, from approximately station 117+40 to about station 118+65, a proposed retaining wall is necessary in order to minimize the taking of structures and to remain within right-of-way limits. Proposed right-of-way limits are shown on the attached plan sheet. The wall will be constructed to allow a 10-ft clearance from the face of wall to the proposed right-of-way. A five-foot tall wall is proposed along the edge of the proposed right-of-way and Fairfield Ave and a variable height wall is proposed along I-90 westbound. This double wall concept allows for aesthetic enhancements in this area.

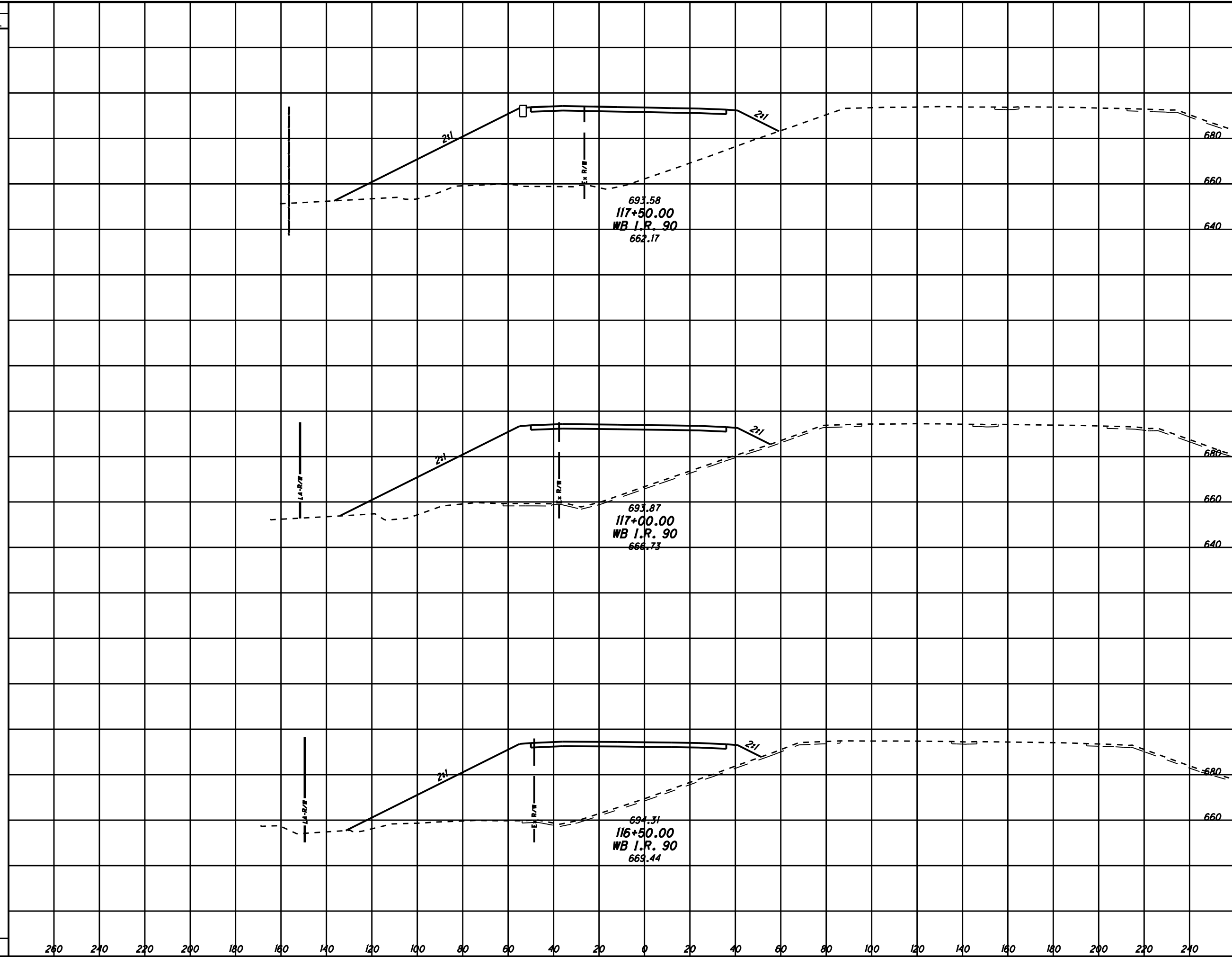


CALCULATED
 CHECKED
 0 20 40 80
 HORIZONTAL
 SCALE IN FEET

RETAINING WALL JUSTIFICATION STUDY
 I-90 WESTBOUND (STA. 116+00 TO 119+00)

CUY-90-INNERBELT
 2
 4

SEEDING
END WIDTH SO. YDS.



END AREA
CUT FILL

Station	END AREA		VOLUME	
	CUT	FILL	CUT	FILL
117+50.00				
117+00.00				
116+50.00				

CALCULATED
 CHECKED
RETAINING WALL JUSTIFICATION STUDY
I-90 WESTBOUND (STA. 116+50 TO STA. 117+50)
CUY-90-INNERBELT

SEEDING

END WIDTH SO. YDS.

END AREA

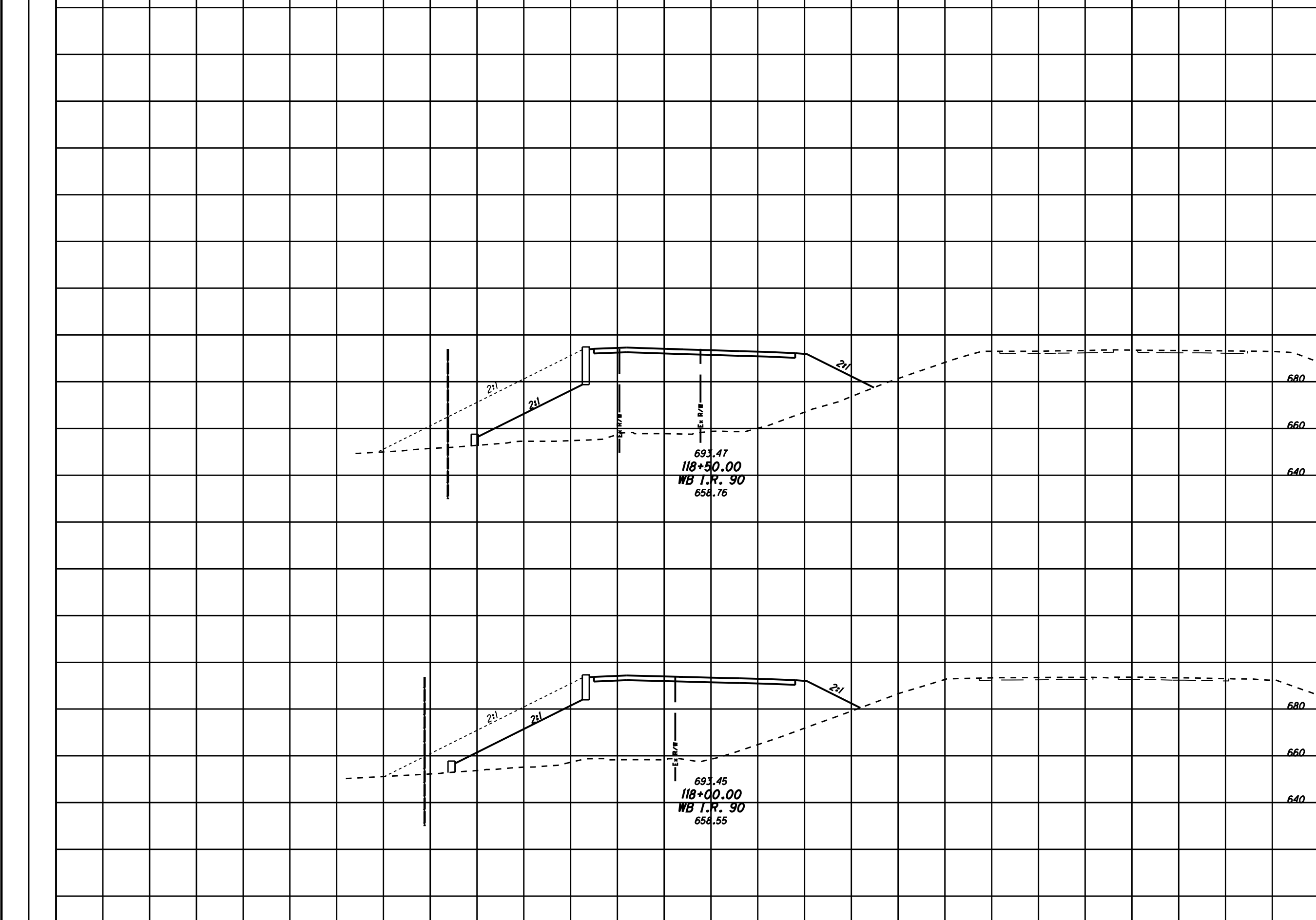
VOLUME

CUT FILL

CUT FILL

CALCULATED

CHECKED



RETAINING WALL JUSTIFICATION STUDY
I-90 WESTBOUND (STA. 118+00 TO STA. 118+50)

CUY-90-INNERBELT

4
4

260 240 220 200 180 160 140 120 100 80 60 40 20 0 20 40 60 80 100 120 140 160 180 200 220 240

Retaining Wall Justification

Ramp A6

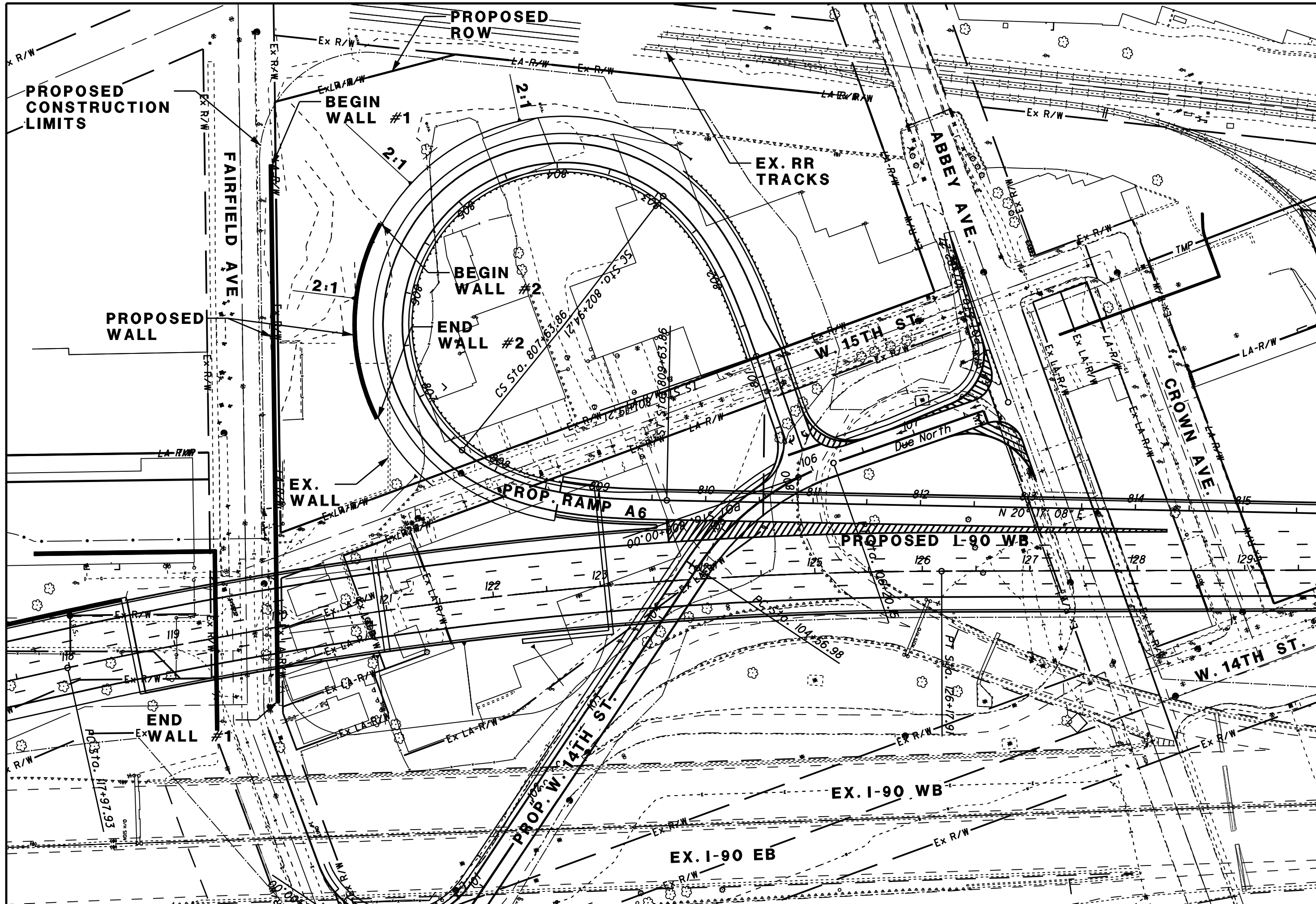
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2. PLAN & CROSS SECTION SHEETS (ALTERNATIVE 1)
3. PLAN & CROSS SECTION SHEETS (ALTERNATIVE 2)

1. INTRODUCTION AND EXECUTIVE SUMMARY

Ramp A6 is a loop ramp from proposed westbound I-90 to the proposed West 14th Street extension. It is located in between Abbey and Fairfield Avenues to the north and south, respectively and east of the Norfolk Southern railroad tracks. See attached plan views for layout and location of ramp. The proposed ramp, along with the proposed westbound I-90 will require additional right-of-way and the taking of structures in this area. Right-of-way acquisition limits were determined prior to the development of the retaining wall justification studies.

Based on the cross sections, it can be seen that a retaining wall is required along Fairfield Avenue. A five-foot tall wall is proposed along the edge of Fairfield Ave and a variable height wall is proposed along the outside edge of the proposed ramp. This double wall concept allows for aesthetic enhancements in this area.



PROPOSED
CONSTRUCTION
LIMITS

PROPOSED
WALL

BEGIN
WALL #1

BEGIN
WALL #2

END
WALL #2

EX.
WALL

PROP. RAMP A6

PROPOSED L-90 WB

END
WALL #1

PROP. W. 14TH ST.

EX. I-90 EB

EX. I-90 WB

EX. RR
TRACKS

ABBEY AVE.

W. 15TH ST.

CROWN AVE.

W. 14TH ST.



20
HORIZONTAL
SCALE IN FEET

CHECKED
CALCULATED

RETAINING WALL JUSTIFICATION STUDY
RAMP A6

CUY-90-INNERBELT

2
6

Retaining Wall Justification

Gateway Animal Clinic Parking Lot

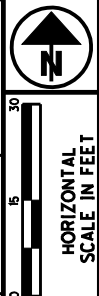
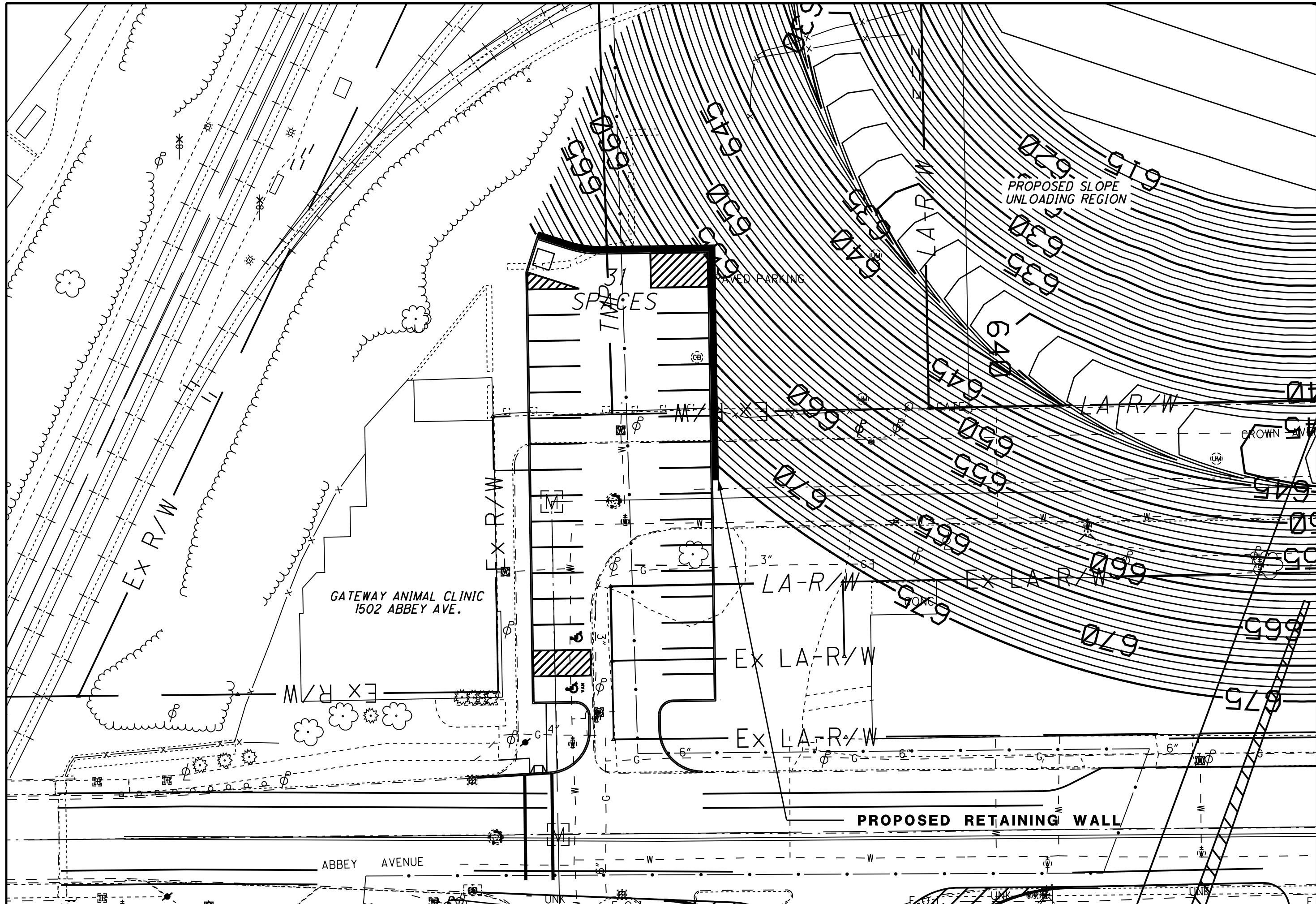
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1. INTRODUCTION AND EXECUTIVE SUMMARY..... 1
2. PLAN & CROSS SECTION SHEETS

1. INTRODUCTION AND EXECUTIVE SUMMARY

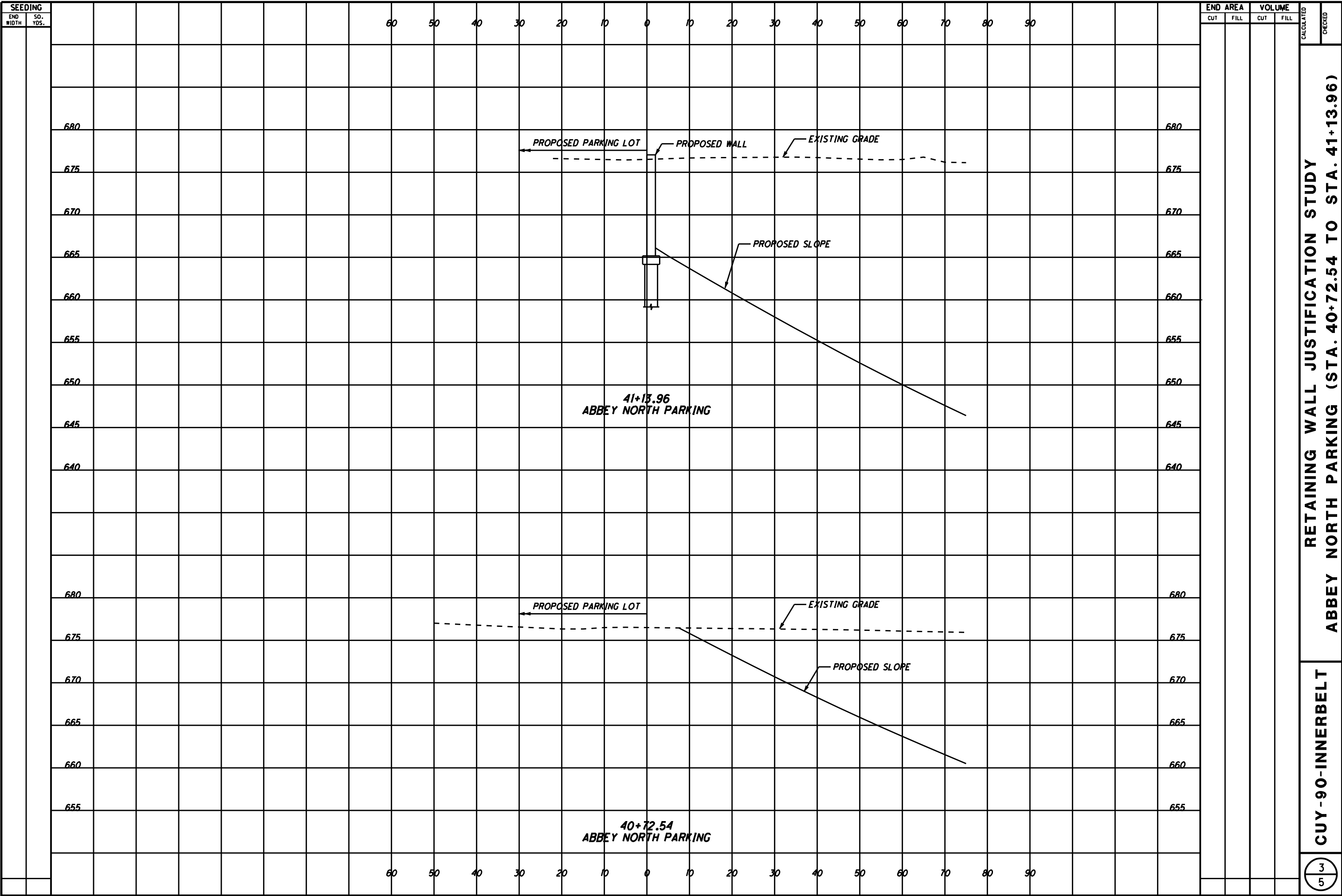
The Gateway Animal Clinic Parking Lot is located between Abbey Rd and the proposed West Slope. See attached plan view for layout of parking area and proposed wall. The parking lot dimensions were agreed on through right-of-way negotiations. The proposed grading of the west slope is a requirement for slope

stability improvements. Therefore, a retaining structure is required along the top of the slope to accommodate the proposed parking lot. Right-of-way acquisition limits for the proposed parking lot shown are being finalized by ODOT.



RETAINING WALL JUSTIFICATION STUDY
 ABBEY NORTH PARKING LOT

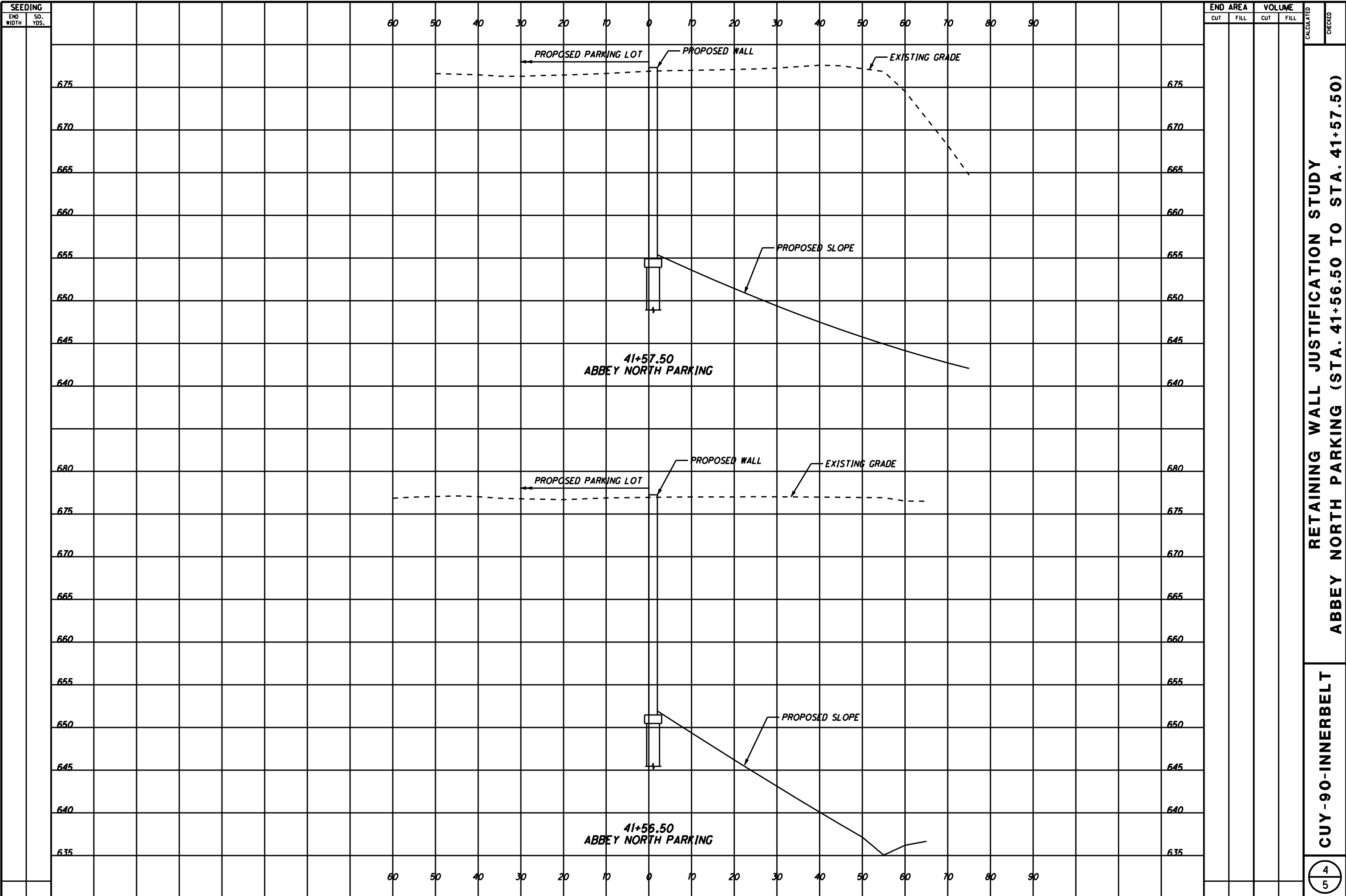
CUY-90-14.52



RETAINING WALL JUSTIFICATION STUDY
 ABBEY NORTH PARKING (STA. 40+72.54 TO STA. 41+13.96)

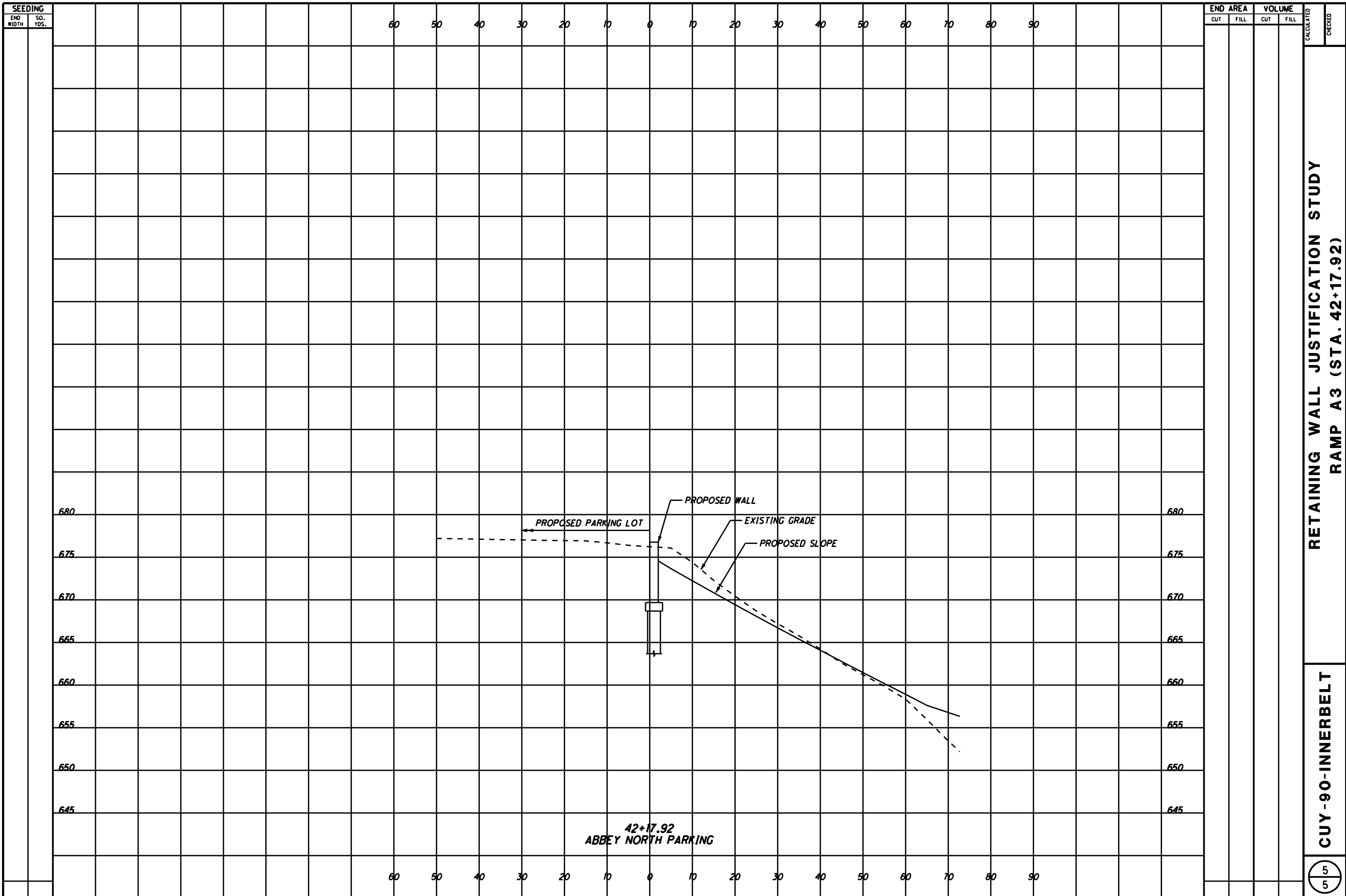
CUY-90-INNERBELT

3
5



RETAINING WALL JUSTIFICATION STUDY
 ABBEY NORTH PARKING (STA. 41+56.50 TO STA. 41+57.50)

CUY-90-INNERBELT



RETAINING WALL JUSTIFICATION STUDY
RAMP A3 (STA. 42+17.92)

CUY-90-INNERBELT

5/5

Retaining Wall Justification

I-90 WB (Stations 170+00 to 176+00)

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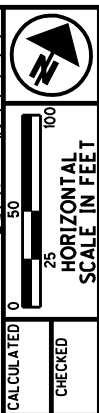
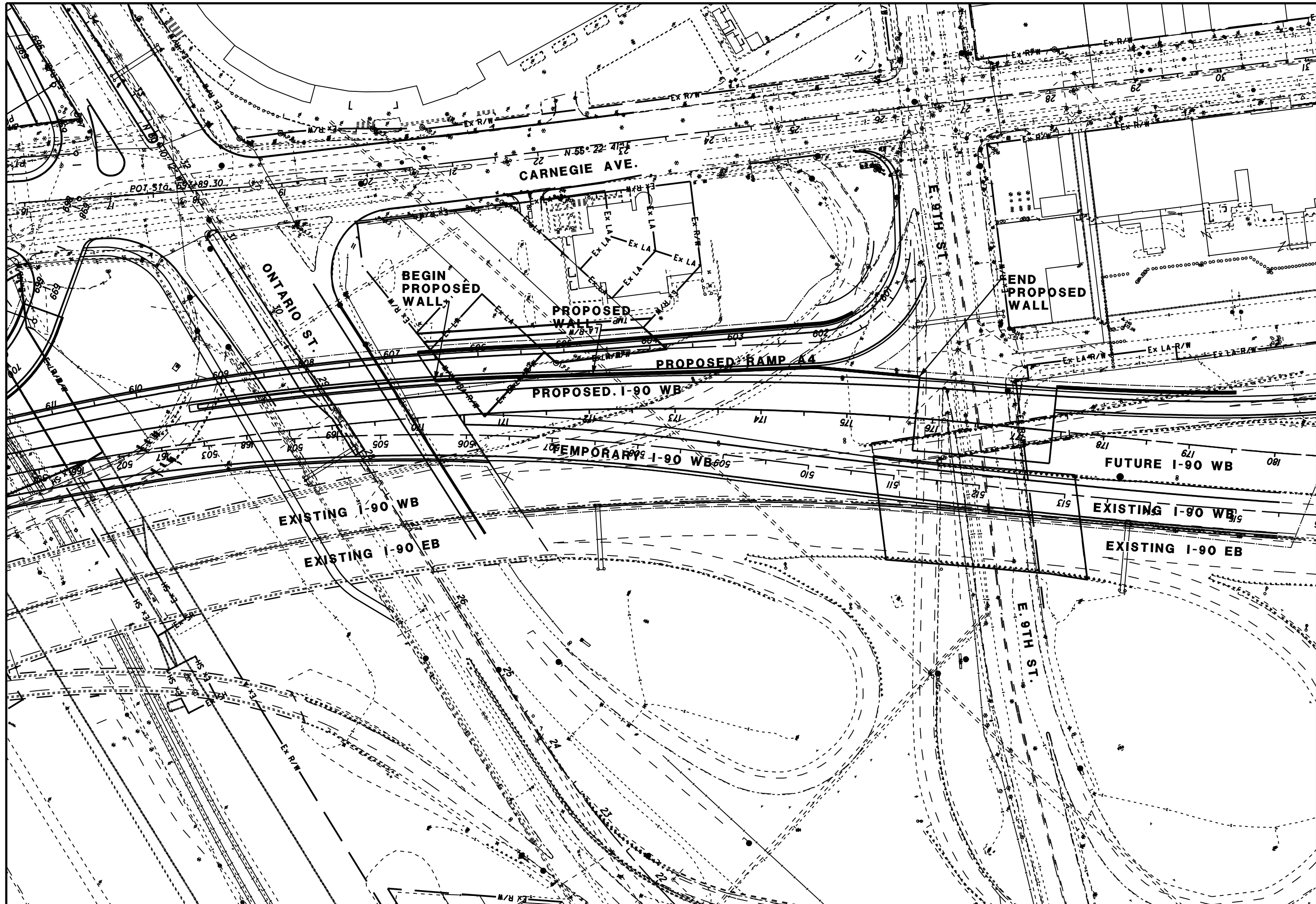
1. INTRODUCTION AND EXECUTIVE SUMMARY..... 1
2. PLAN & CROSS SECTION SHEETS

1. INTRODUCTION AND EXECUTIVE SUMMARY

Proposed westbound I-90 is new construction that extends from just south of the Starkweather Avenue overpass bridge structure to just east of the East 9th Street overpass bridge structure. This new construction is about 1.5 miles in length and is located just north or west of existing I-90. Bridge improvements include widening of the Kenilworth Avenue overpass, 1 mile of new bridge from just south of Fairfield Avenue to just east of Ontario Street and a new bridge over East 9th Street. Proposed westbound I-90 requires the purchase of new right-of-way and the taking of structures.

A proposed retaining wall is shown on the plan view, and it extends from approximately station 170+20 to about station 175+80. This wall is located between proposed westbound I-90 and the proposed ramp A4, and it is positioned between the bridge overpass structures from Ontario Street to East 9th Street.

Based on the Contract Group 1 Conceptual Plans and cross sections, it can be seen that an elevation difference exists between westbound I-90 and the ramp A4, and since they are located directly adjacent to one another, a retaining wall is required.



CALCULATED
 CHECKED
RETAINING WALL JUSTIFICATION STUDY
I-90 WESTBOUND (STA. 170+00 TO 176+00)

CUY-90-INNERBELT
2
7

SEEDING

END AREA

VOLUME

END WIDTH

SO. YDS.

CUT

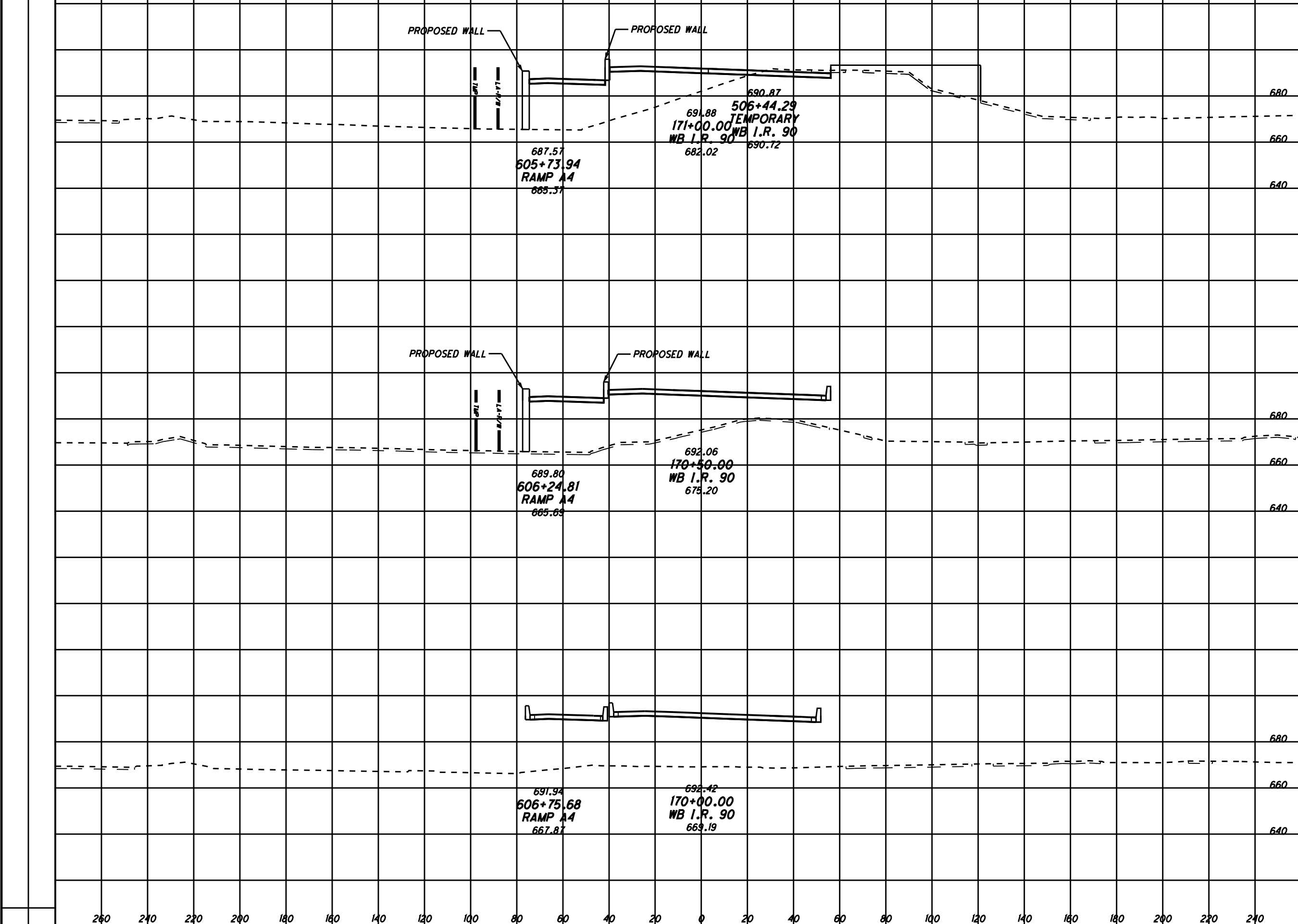
FILL

CUT

FILL

CALCULATED

CHECKED



RETAINING WALL JUSTIFICATION STUDY
I-90 WESTBOUND - 2 (STA. 170+00 TO STA. 171+00)

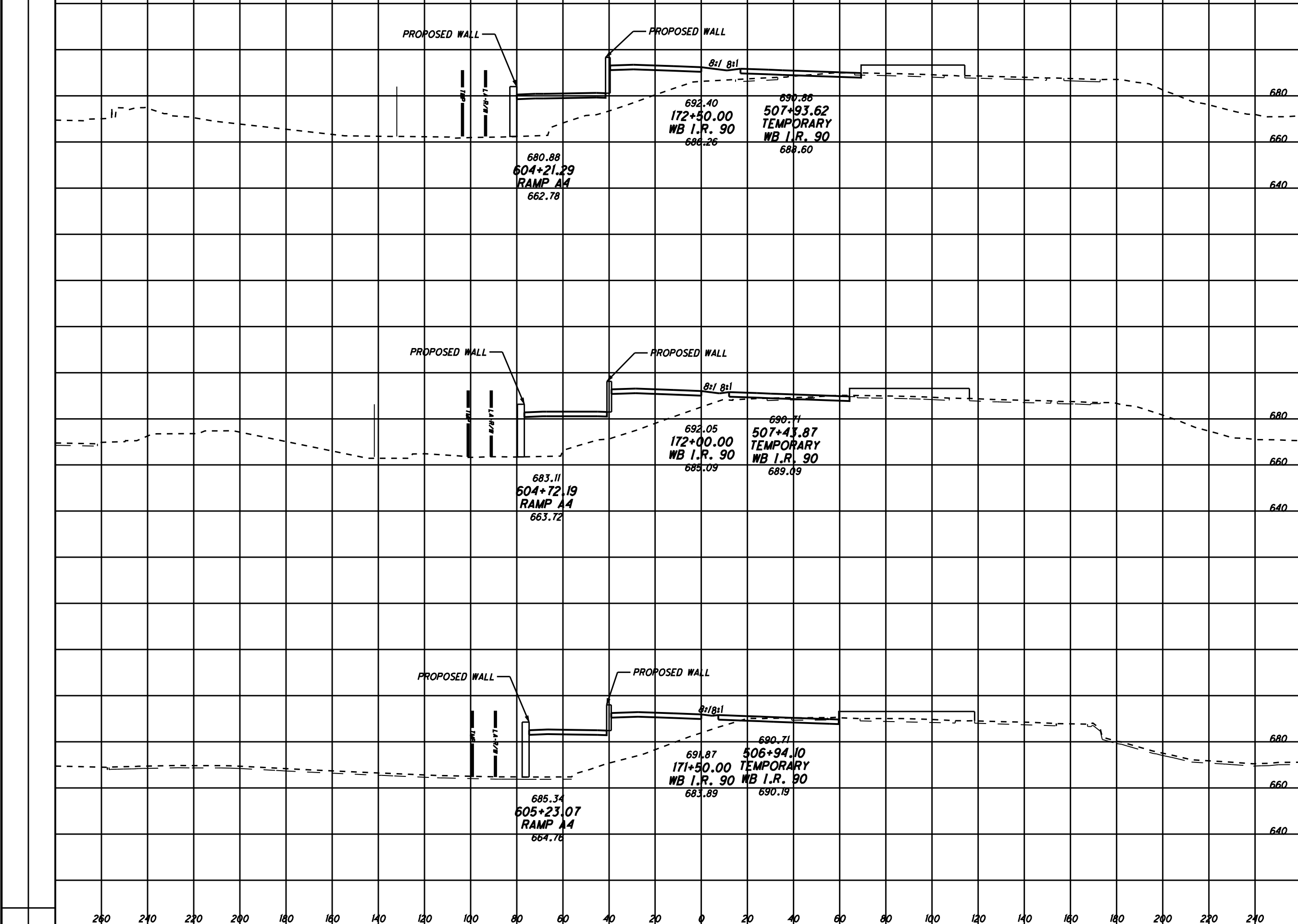
CUY-90-INNERBELT

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SEEDING
END WIDTH SQ. YDS.

END AREA VOLUME
CUT FILL CUT FILL

CALCULATED
CHECKED



RETAINING WALL JUSTIFICATION STUDY
I-90 WESTBOUND - 2 (STA. 171+50 TO STA. 172+50)

CUY-90-INNERBELT

4
7

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SEEDING
END WIDTH SQ. YDS.

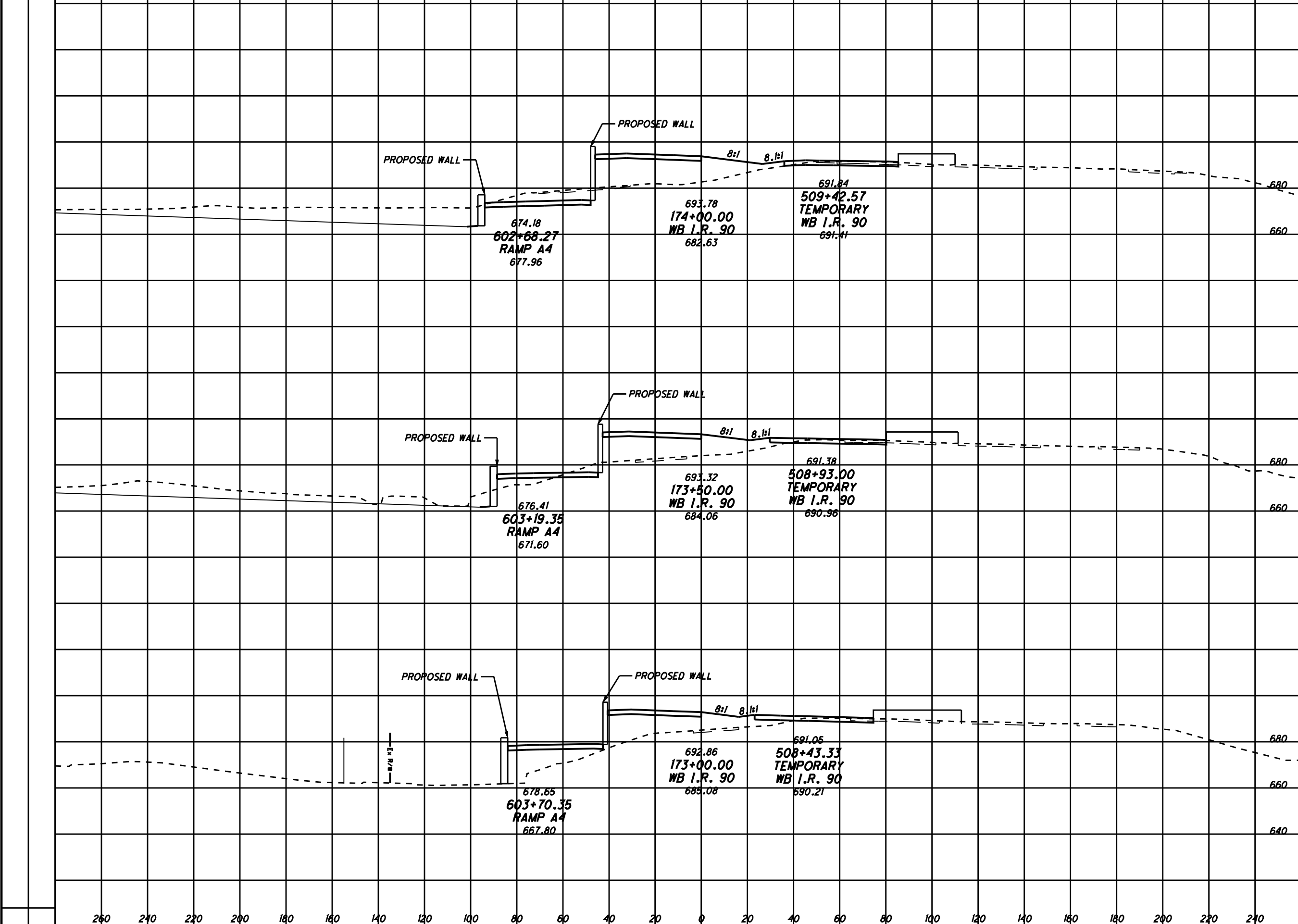
END AREA VOLUME
CUT FILL CUT FILL

CALCULATED
CHECKED

RETAINING WALL JUSTIFICATION STUDY
I-90 WESTBOUND - 2 (STA.173+00 TO STA.174+00)

CUY-90-INNERBELT

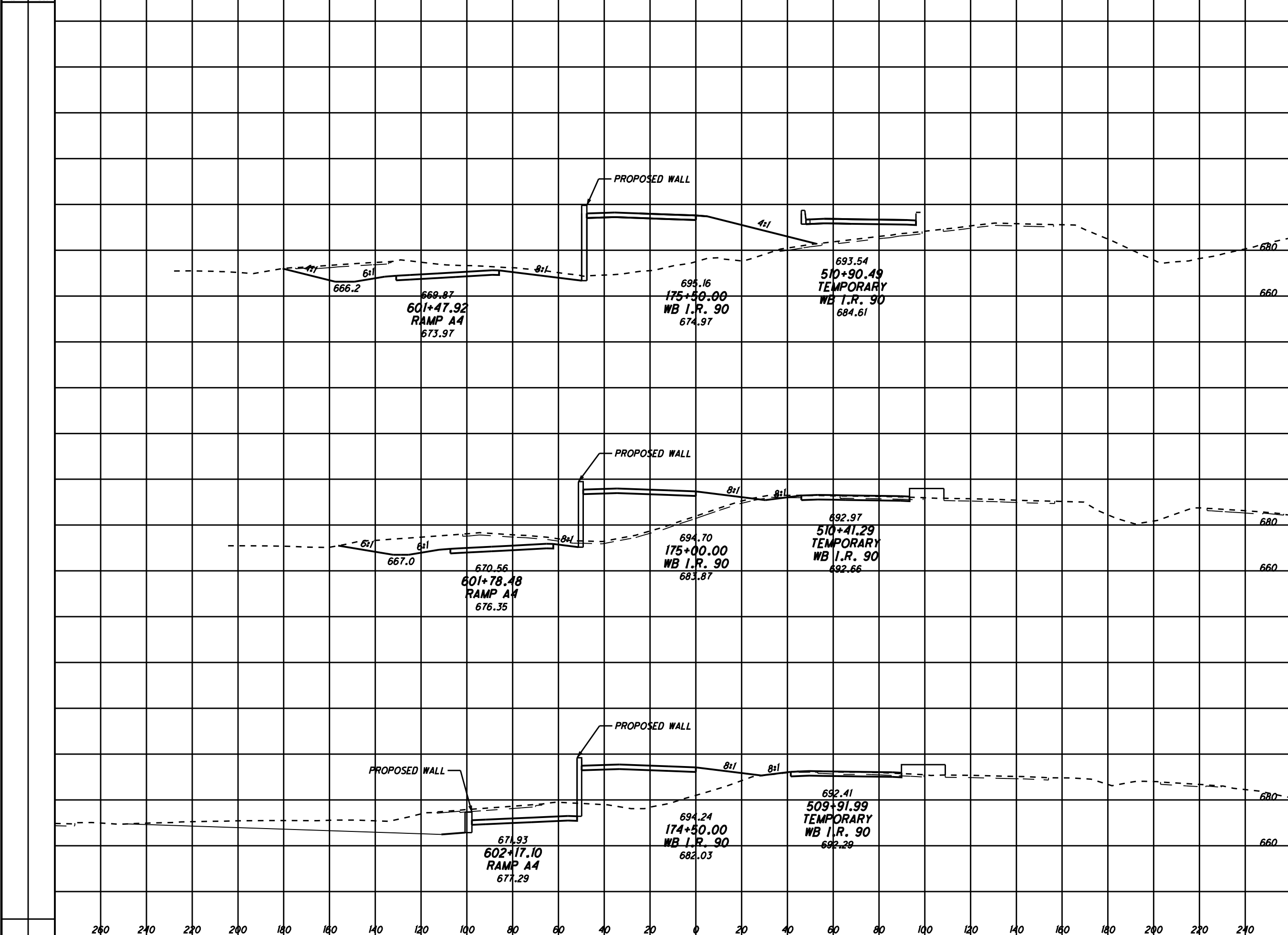
5
7



260 240 220 200 180 160 140 120 100 80 60 40 20 0 20 40 60 80 100 120 140 160 180 200 220 240

SEEDING
END WIDTH SO. YDS.

END AREA VOLUME
CUT FILL CUT FILL
CALCULATED CHECKED



RETAINING WALL JUSTIFICATION STUDY
I-90 WESTBOUND - 2 (STA. 174+50 TO STA. 175+50)

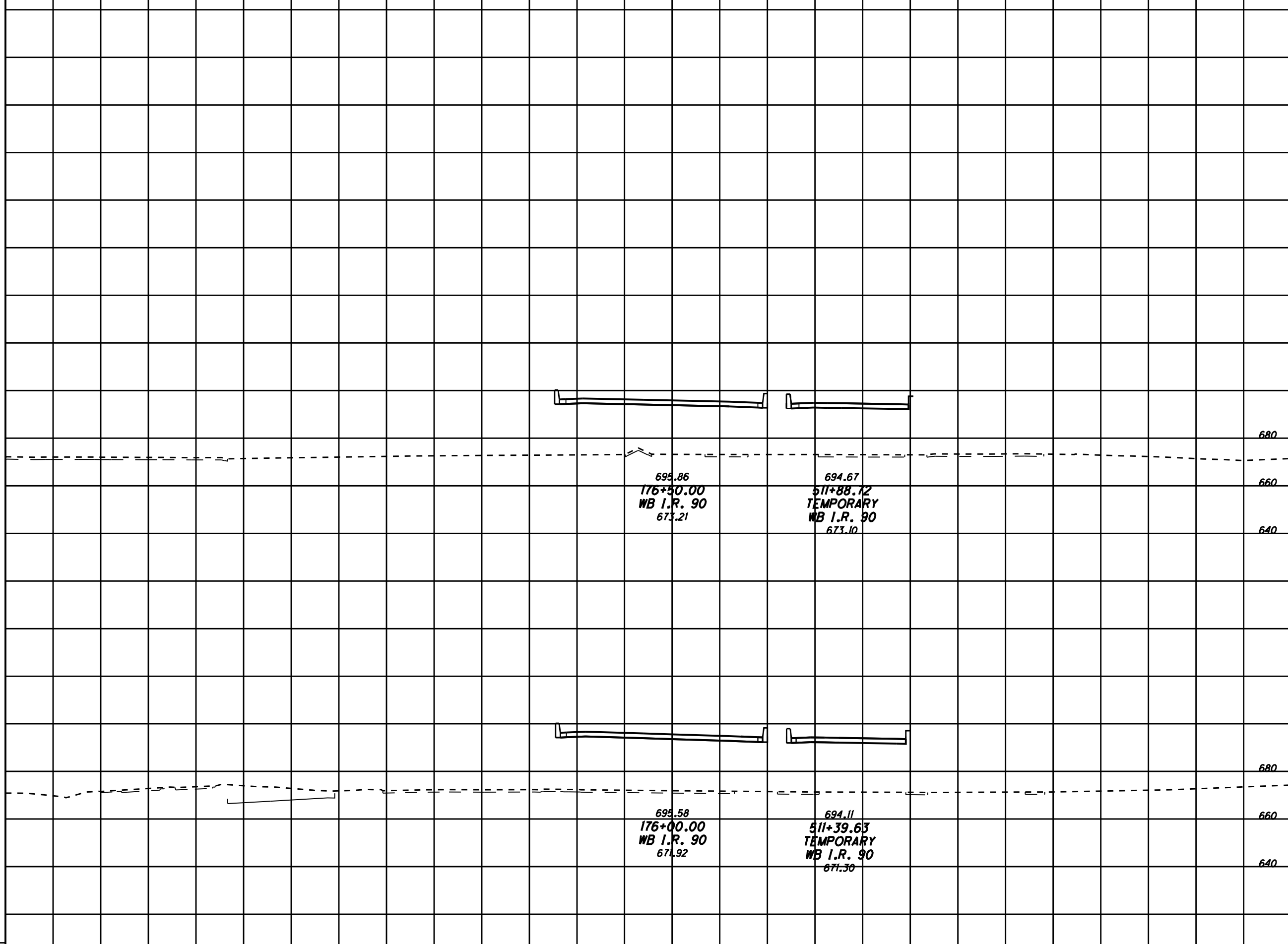
CUY-90-INNERBELT

6
7

SEEDING
END SO. WID. YDS.

END AREA
CUT FILL
VOLUME
CUT FILL

CALCULATED
CHECKED



RETAINING WALL JUSTIFICATION STUDY
I-90 WESTBOUND - 2 (STA. 176+00 TO STA. 176+50)

CUY-90-INNERBELT

7
7

Retaining Wall Justification

Ramp A4

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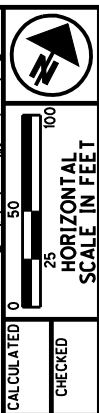
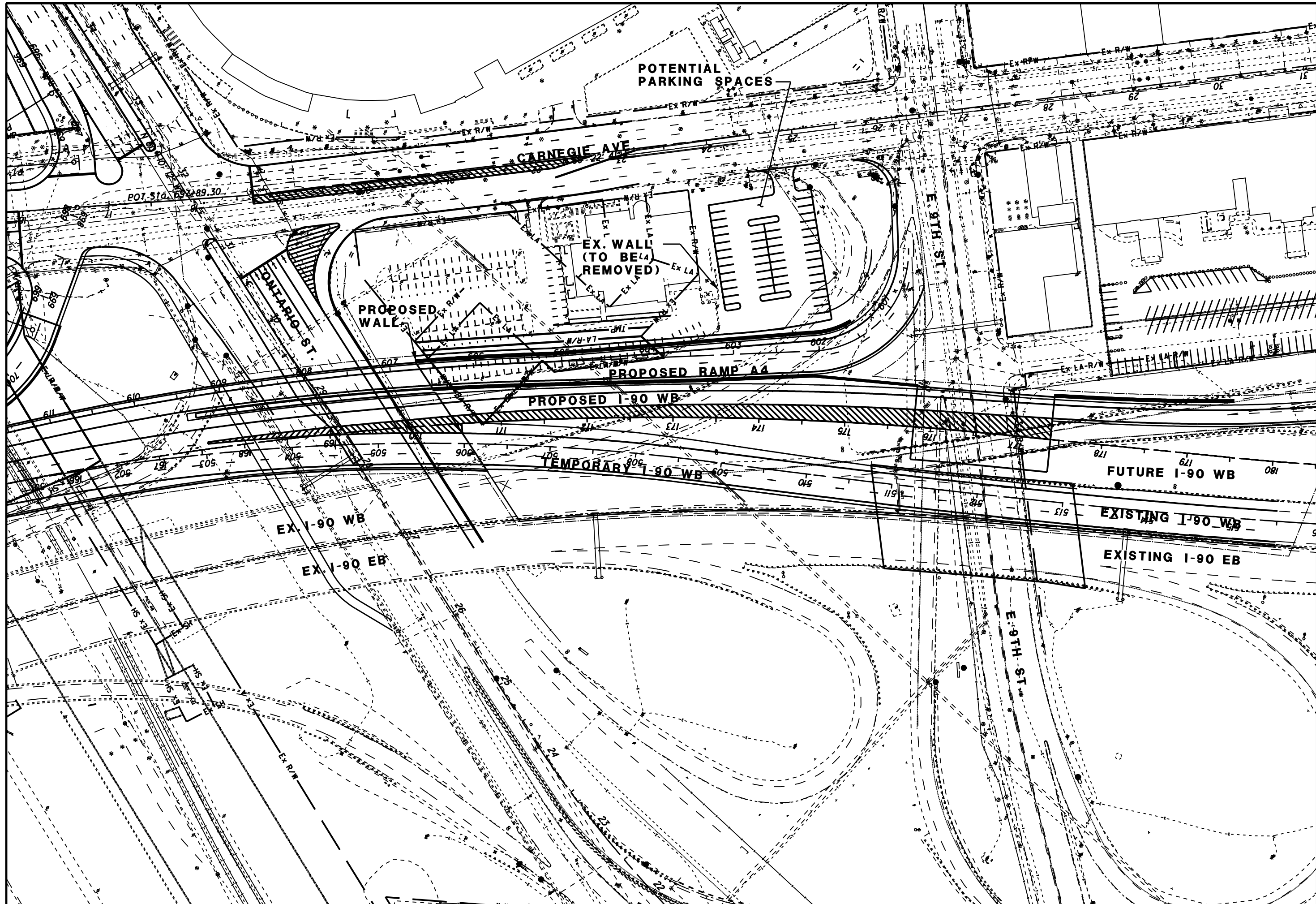
1. INTRODUCTION AND EXECUTIVE SUMMARY

Ramp A4 is a new ramp from existing East 9th Street to the proposed westbound I-90. It is somewhat parallel to but offset of Carnegie Avenue. The property in between this new ramp and Carnegie Avenue is Cuyahoga Community College. This property is landlocked on all four sides by roadway right-of-way. See attached plan view for layout and location of ramp and existing structure and parking area.

The location and estimated length of the proposed retaining wall is shown on the plan view. It goes from approximately station 601+50 to station 606+70 where it ties into the ramp's proposed bridge structure over

Ontario Street. The proposed retaining wall impacts an existing retaining structure near station 603+50. The existing structure will be removed to allow for access to a new parking lot at this location.

The proposed retaining wall is required in order to minimize the amount of property needed from Cuyahoga Community College and to allow for the construction of the proposed parking lot. Right-of-way acquisition limits for the proposed parking lot shown are being finalized by ODOT. Prohibiting access to the rear of the building is not a feasible alternative. Therefore, a no-wall alternative is not practicable. The lighting in this vicinity will need to be relocated as well.



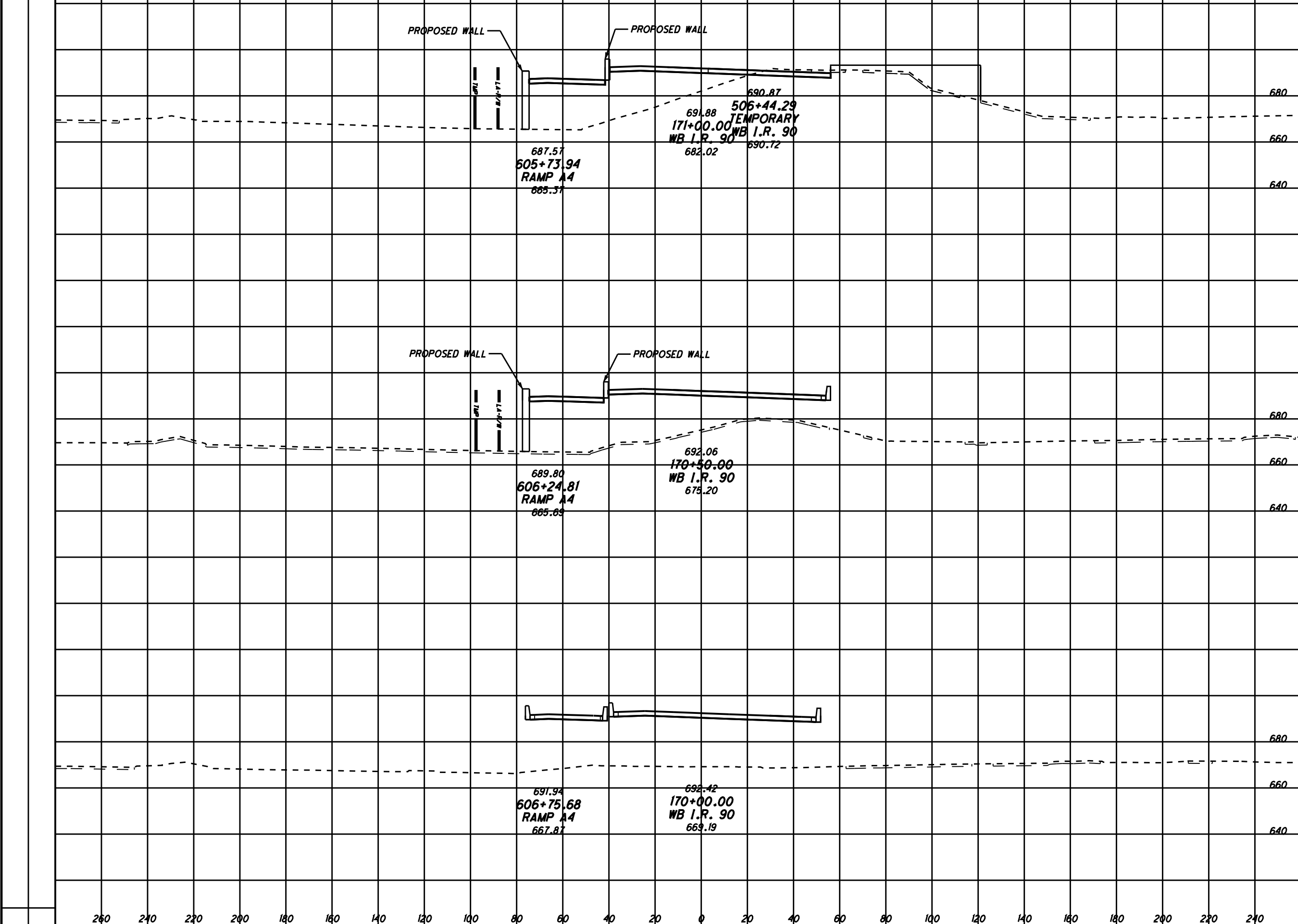
CALCULATED
 CHECKED
RETAINING WALL JUSTIFICATION STUDY
RAMP A4

CUY-90-INNERBELT
27

SEEDING
END SO.
WIDTH YDS.

END AREA
CUT FILL
VOLUME
CUT FILL

CALCULATED
CHECKED



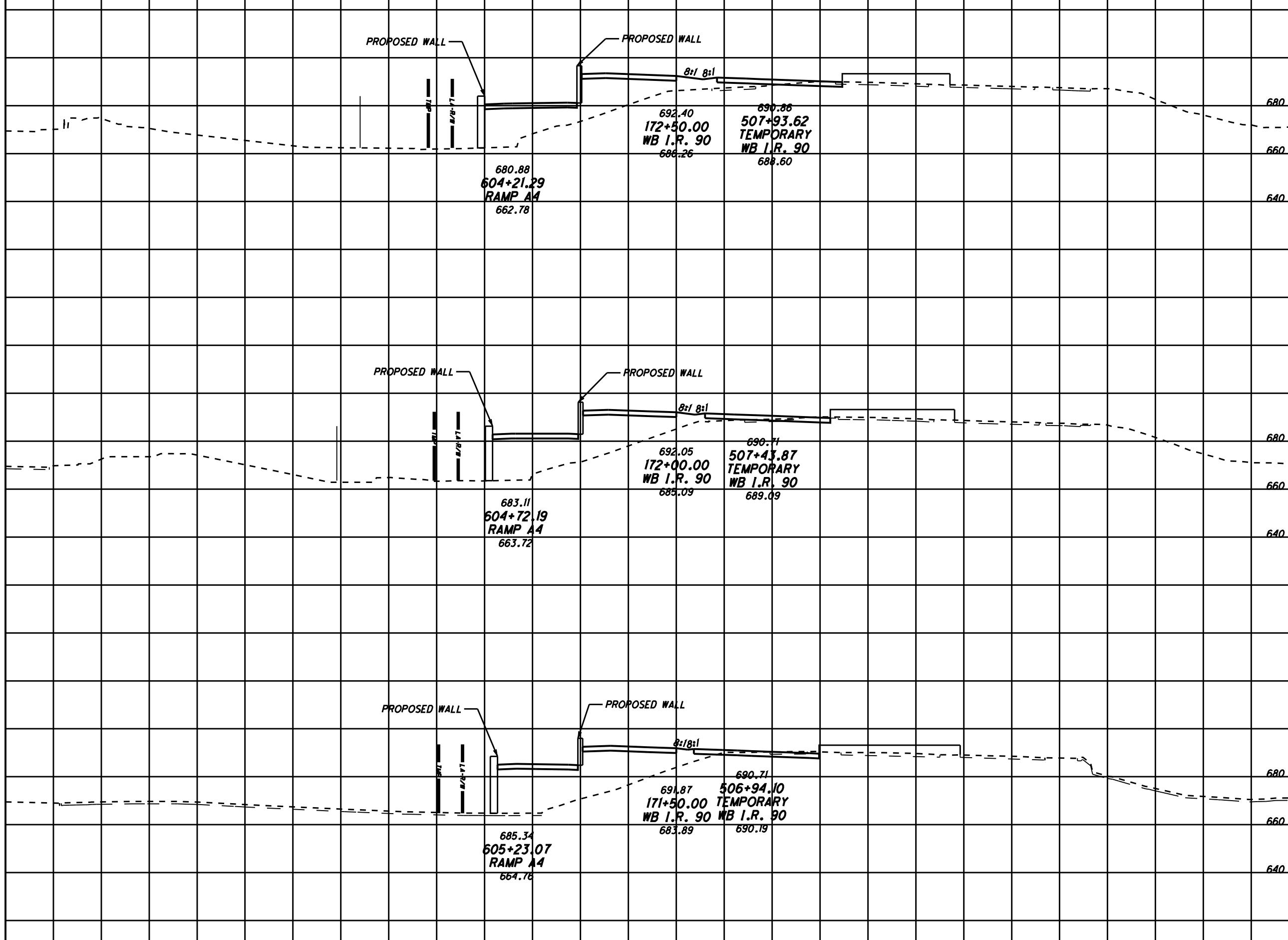
RETAINING WALL JUSTIFICATION STUDY
I-90 WESTBOUND - 2 (STA. 170+00 TO STA. 171+00)

CUY-90-INNERBELT

3
7

SEEDING
END SO.
WIDTH YDS.

END AREA
CUT FILL
VOLUME
CUT FILL
CALCULATED
CHECKED



RETAINING WALL JUSTIFICATION STUDY
I-90 WESTBOUND - 2 (STA. 171+50 TO STA. 172+50)

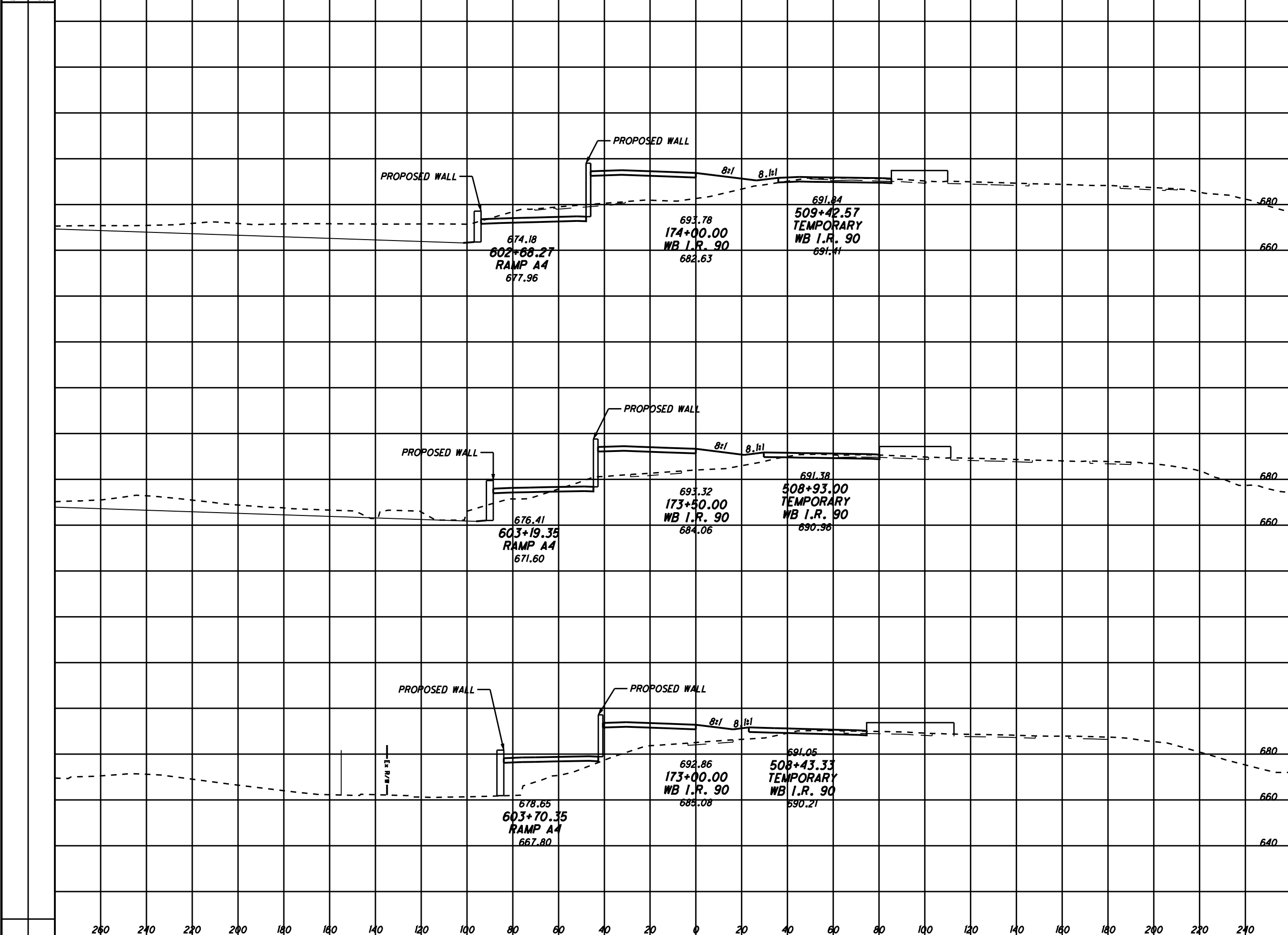
CUY-90-INNERBELT

4
7

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SEEDING
END WIDTH SO. YDS.

END AREA VOLUME
CUT FILL CUT FILL
CALCULATED CHECKED



RETAINING WALL JUSTIFICATION STUDY
I-90 WESTBOUND - 2 (STA.173+00 TO STA.174+00)

CUY-90-INNERBELT

SEEDING
END WIDTH SQ. YDS.

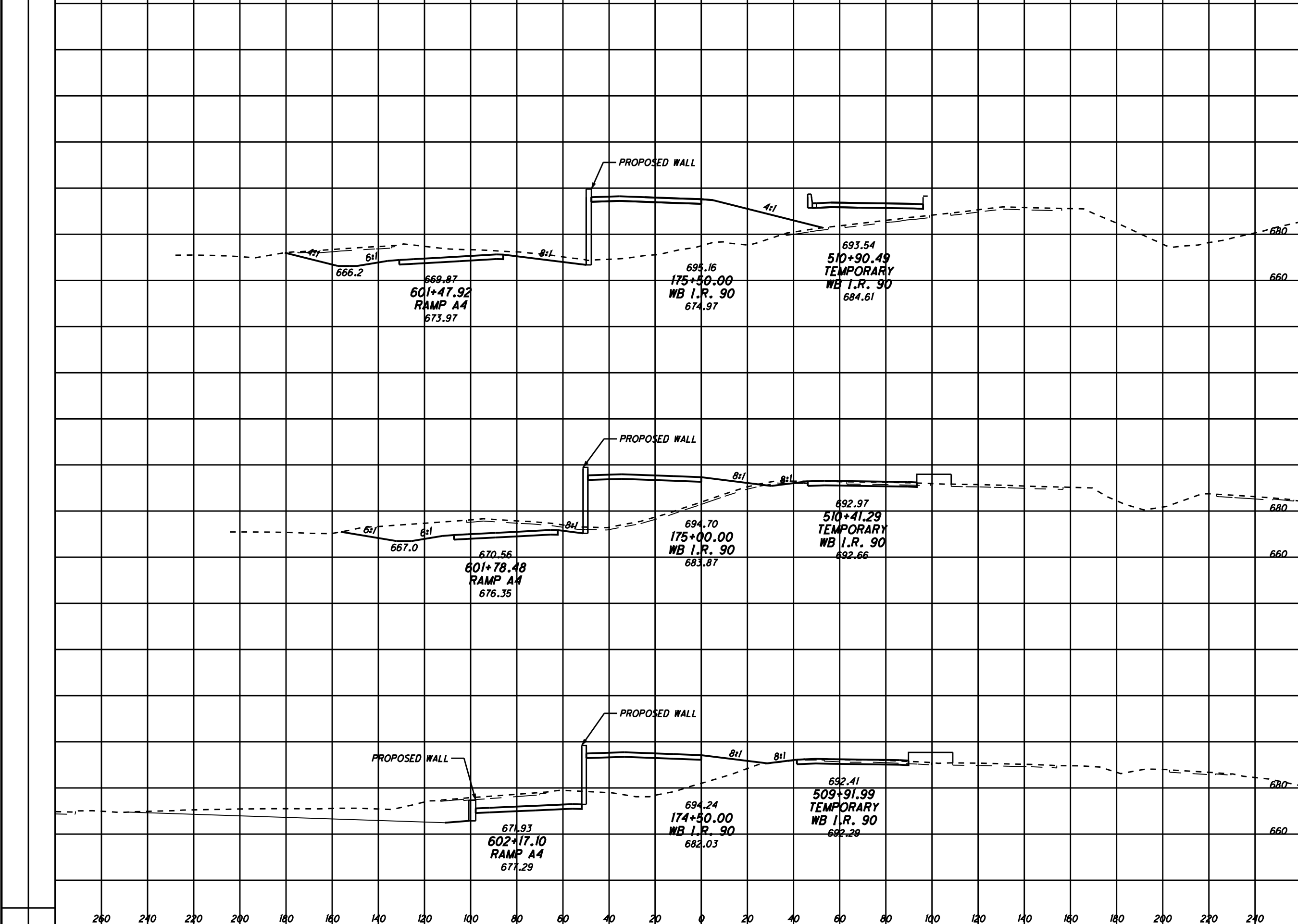
END AREA VOLUME
CUT FILL CUT FILL

CALCULATED
CHECKED

RETAINING WALL JUSTIFICATION STUDY
I-90 WESTBOUND - 2 (STA. 174+50 TO STA. 175+50)

CUY-90-INNERBELT

6
7



Retaining Wall Justification

Ramp A3

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1. INTRODUCTION AND EXECUTIVE SUMMARY..... 1

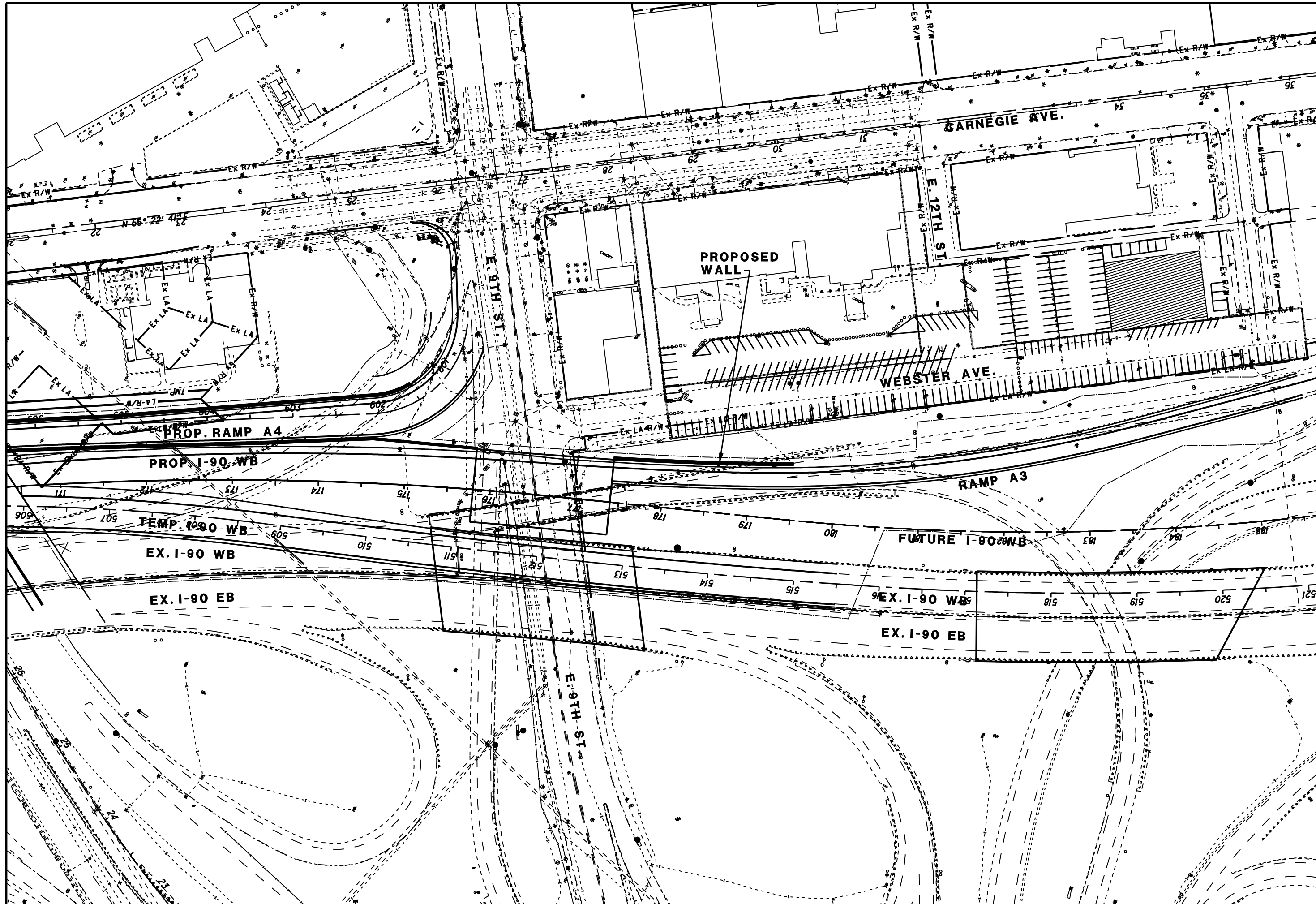
2. PLAN & CROSS SECTION SHEETS

1. INTRODUCTION AND EXECUTIVE SUMMARY

Ramp A3 is a ramp with its entrance beginning at the intersection of existing East 14th Street and Carnegie Avenue to the proposed westbound I-90. It is somewhat parallel and close to Webster Avenue. Webster Avenue runs from East 9th Street to East 13th Street and is surrounded by parking on both sides of the street for the commercial properties in this area. The commercial properties extend from East 9th Street to East 14th Street. See attached plan view for layout and location of ramp and existing structures and parking areas.

The location and estimated length of the proposed retaining wall is shown on the plan view. It goes from approximately station 3006+00 to station 3008+10 where it ties into the ramp's proposed bridge structure over East 9th Street.

By utilizing a retaining wall, no additional right-of-way is required and the commercial properties adjacent to this ramp will not lose any parking. Without a wall, additional right-of-way is required, approximately 20 parking spaces will be lost, and the entrance to the parking lot will only allow for one-way traffic.



RETAINING WALL JUSTIFICATION STUDY
RAMP A3

CUY-90-INNERBELT

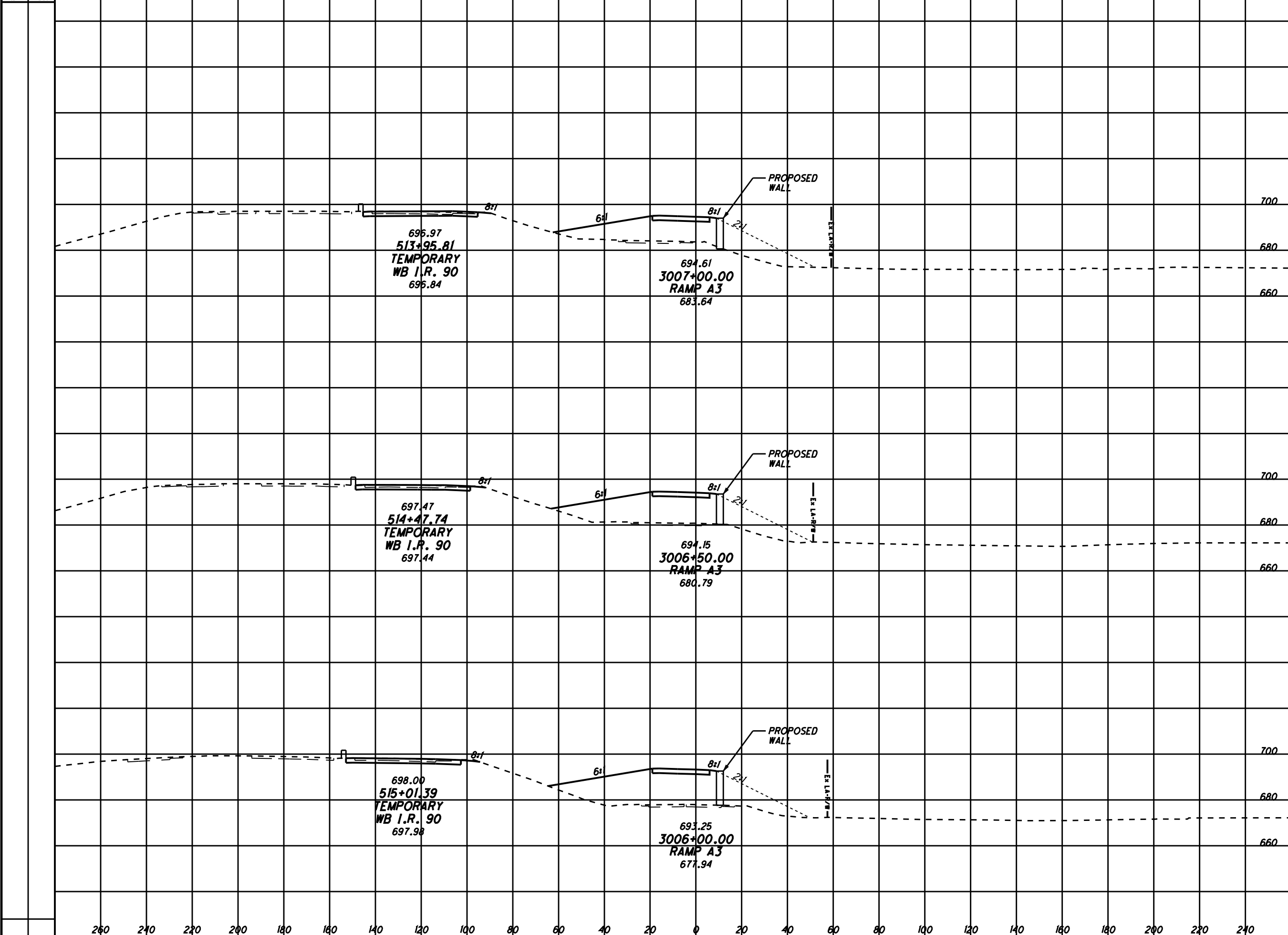
2
4

CALCULATED
CHECKED

0 50 100
HORIZONTAL
SCALE IN FEET

SEEDING
END WIDTH SQ. YDS.

END AREA VOLUME
CUT FILL CUT FILL
CALCULATED CHECKED



RETAINING WALL JUSTIFICATION STUDY
RAMP A3 (STA. 3006+00 TO STA. 3007+00)

CUY-90-INNERBELT

Retaining Wall Justification

Broadway Avenue

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2. PLAN & CROSS SECTION SHEETS (ALTERNATIVE 1)

3. PLAN & CROSS SECTION SHEETS (ALTERNATIVE 2)

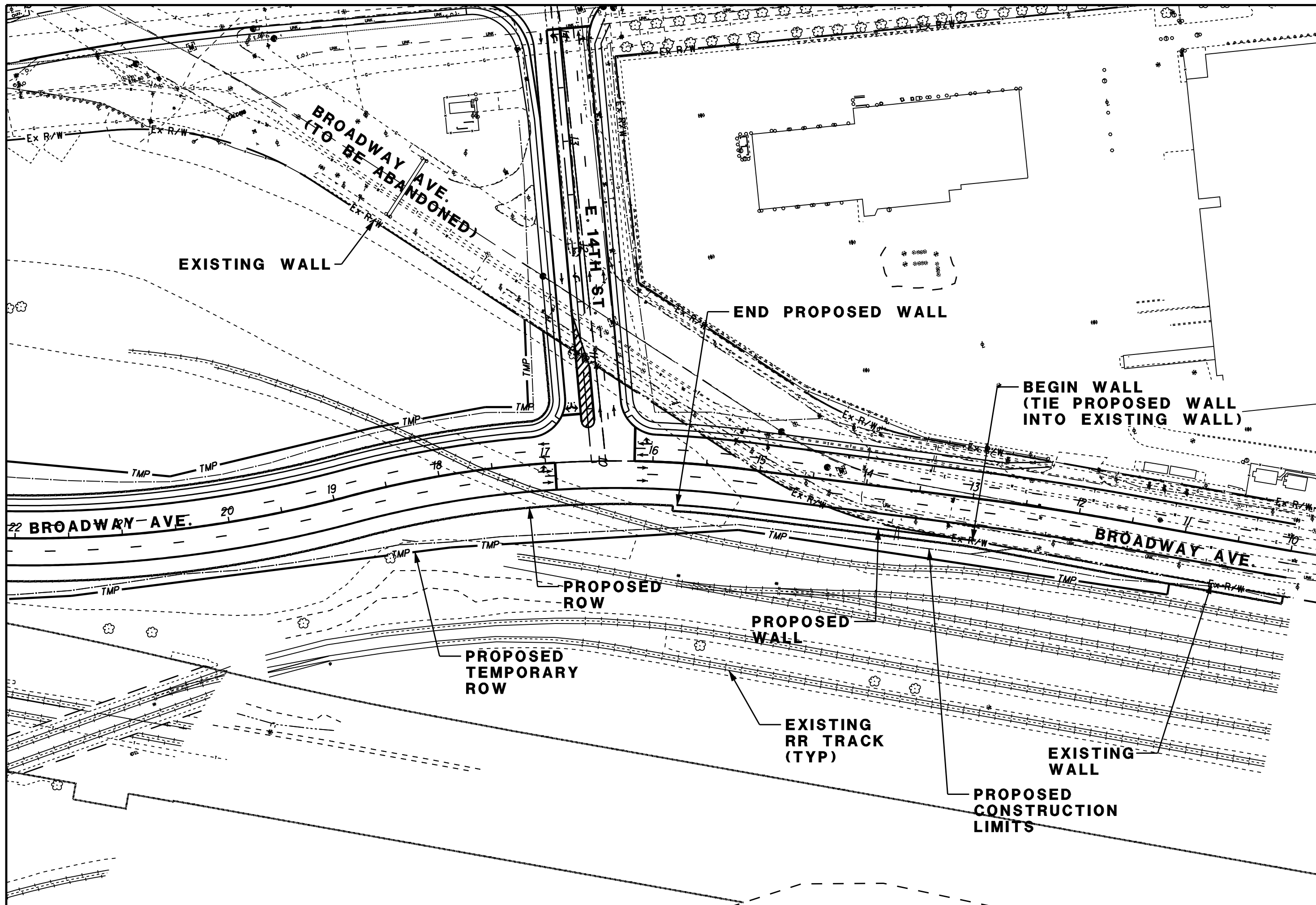
1. INTRODUCTION AND EXECUTIVE SUMMARY

Existing Broadway Avenue is an urban arterial that is being realigned to connect to the proposed Commercial Connector Road. The realignment will tie into existing Broadway Avenue approximately 600 feet east of the proposed East 14th Street extension. The new improvements are approximately 1,500 feet in length and require additional right-of-way. See attached plan views for the realignment of Broadway Avenue.

There is currently an existing retaining wall on the south side of Broadway Avenue that separates the street from the existing Norfolk Western Railway property. This wall extends a few feet above the ground surface of Broadway Avenue. Near station 10+00, there is an elevation difference of the existing ground surfaces of about 16 feet. Further to the west, the difference in elevation becomes null. For example, near station 15+50, the existing ground elevation difference is roughly 4 feet.

See the cross sections for the two scenarios that have been studied and developed. The first alternative provides a retaining wall tying into the existing retaining wall at about station 12+95 and extending west to approximately station 15+75. The second alternative eliminates the proposed retaining wall by providing a fill slope down to the existing ground. The fill slope would start at about station 12+95, and at this location, the existing retaining wall would end. For this scenario, additional temporary right-of-way would be required.

For the first alternative, the area of this proposed retaining wall would be about 2,600 square feet. Using a fill slope and no wall for the second alternative would generate around an additional 1,500 cubic yards of fill material and would also require additional temporary right-of-way of about 0.16 acres. However, the second alternative would reduce the amount of right-of-way needed by about 0.03 acres.

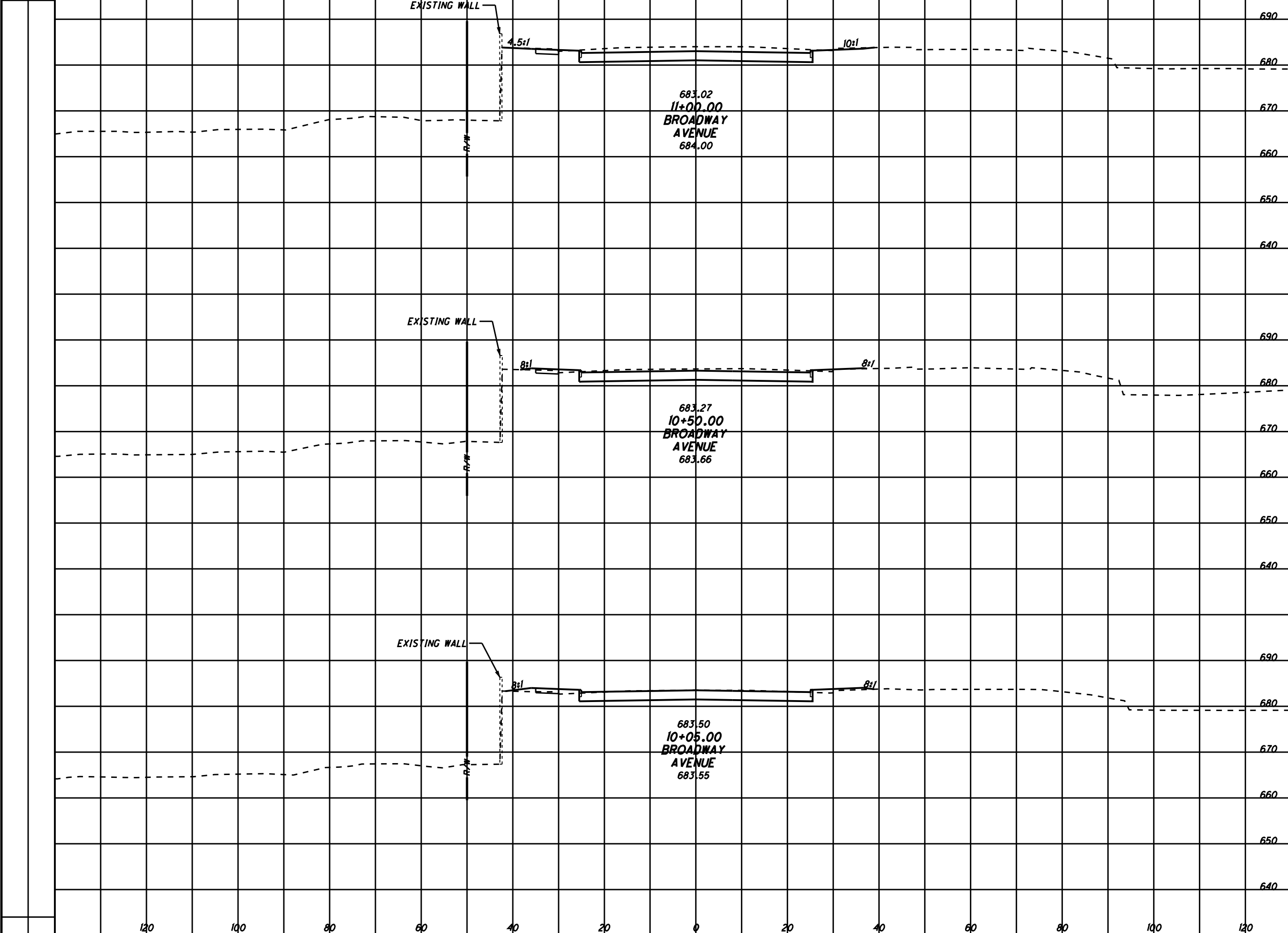


CALCULATED
 CHECKED
RETAINING WALL JUSTIFICATION STUDY
BROADWAY AVENUE (ALTERNATIVE 1)

CUY-90-INNERBELT

SEEDING
END WIDTH SO. YDS.

END AREA VOLUME
CUT FILL CUT FILL
CALCULATED CHECKED



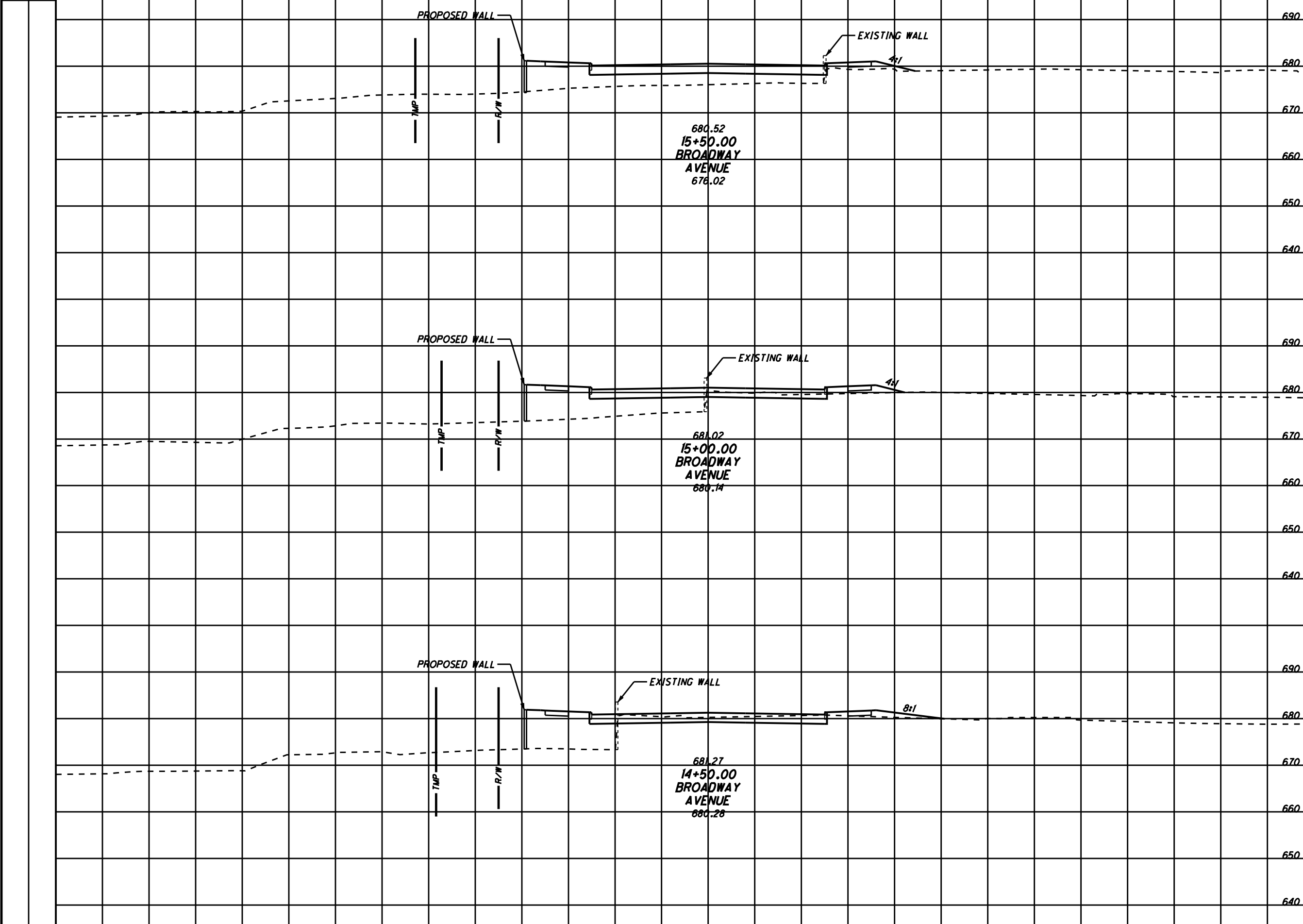
RETAINING WALL JUSTIFICATION STUDY
 BROADWAY AVENUE - ALT 1 (STA. 10+05 TO STA. 11+00)

CUY-90-INNERBELT

3
11

SEEDING
END SO.
WIDTH YDS.

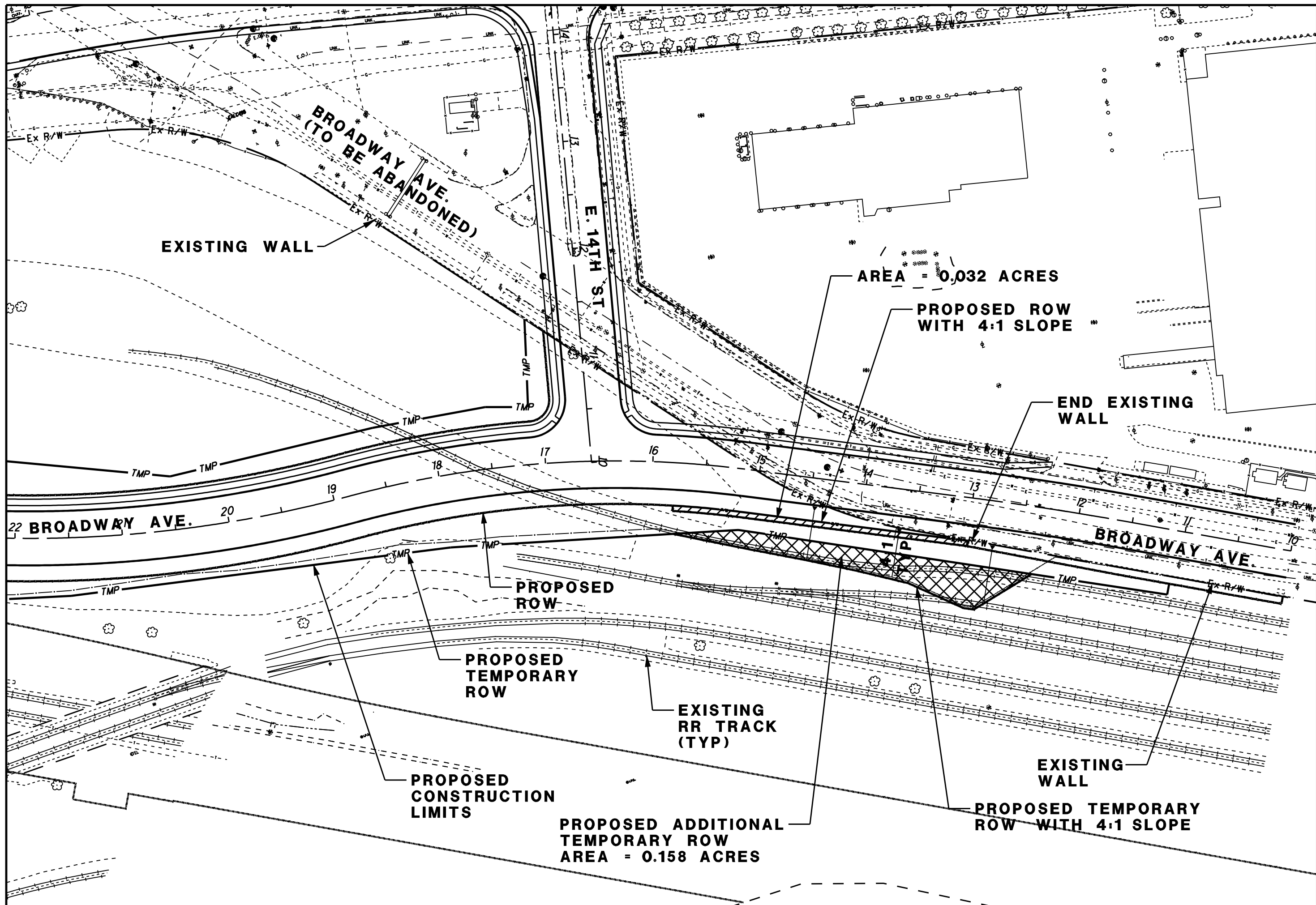
END AREA
CUT FILL
VOLUME
CUT FILL
CALCULATED
CHECKED



RETAINING WALL JUSTIFICATION STUDY
BROADWAY AVENUE - ALT 1 (STA. 14+50 TO STA. 15+50)

CUY-90-INNERBELT

120 100 80 60 40 20 0 20 40 60 80 100 120

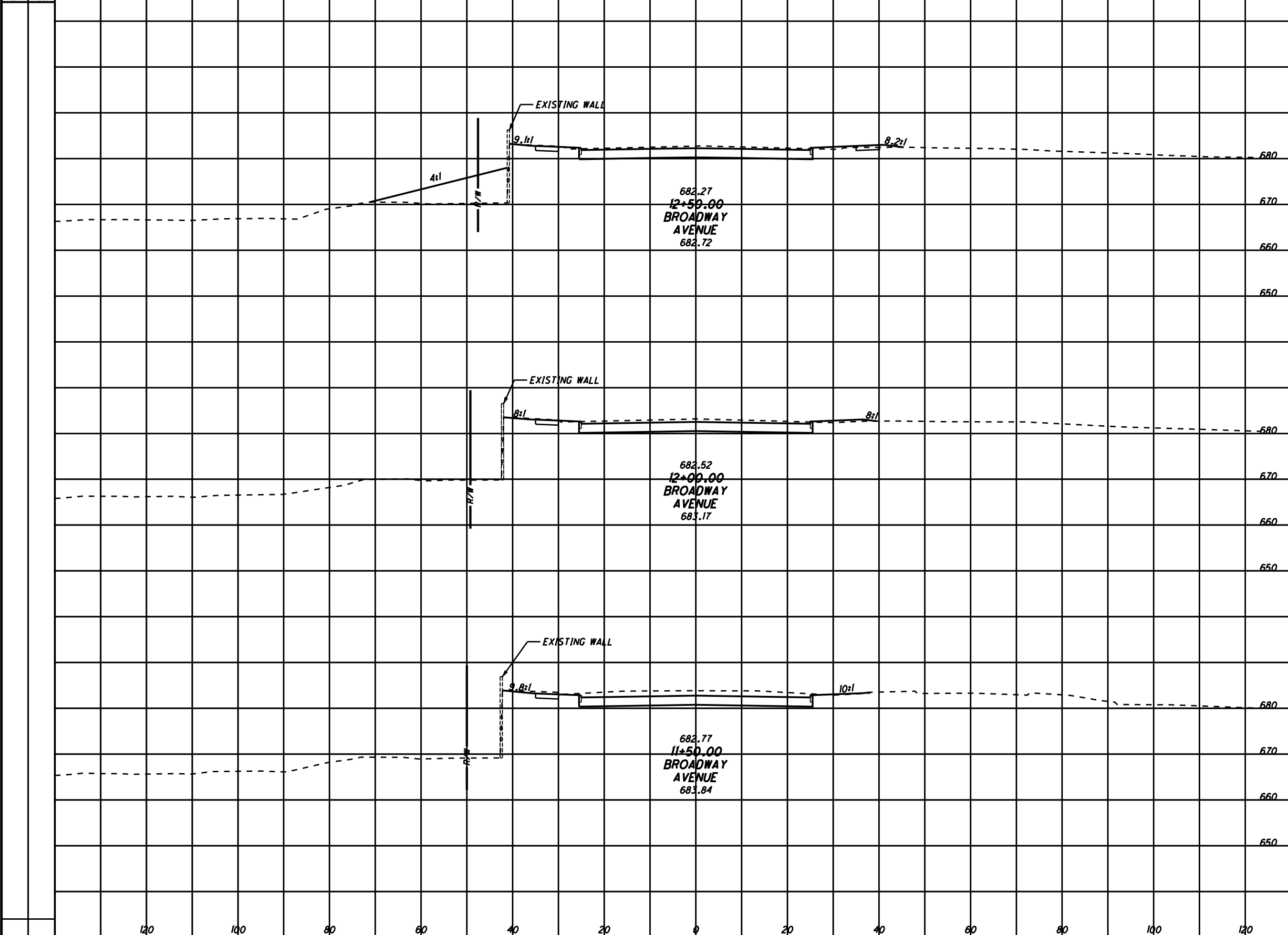


CALCULATED
 CHECKED
RETAINING WALL JUSTIFICATION STUDY
BROADWAY AVENUE (ALTERNATIVE 2)

CUY-90-INNERBELT

SEEDING
END WIDTH SO. YDS.

END AREA VOLUME
CUT FILL CUT FILL
CALCULATED CHECKED

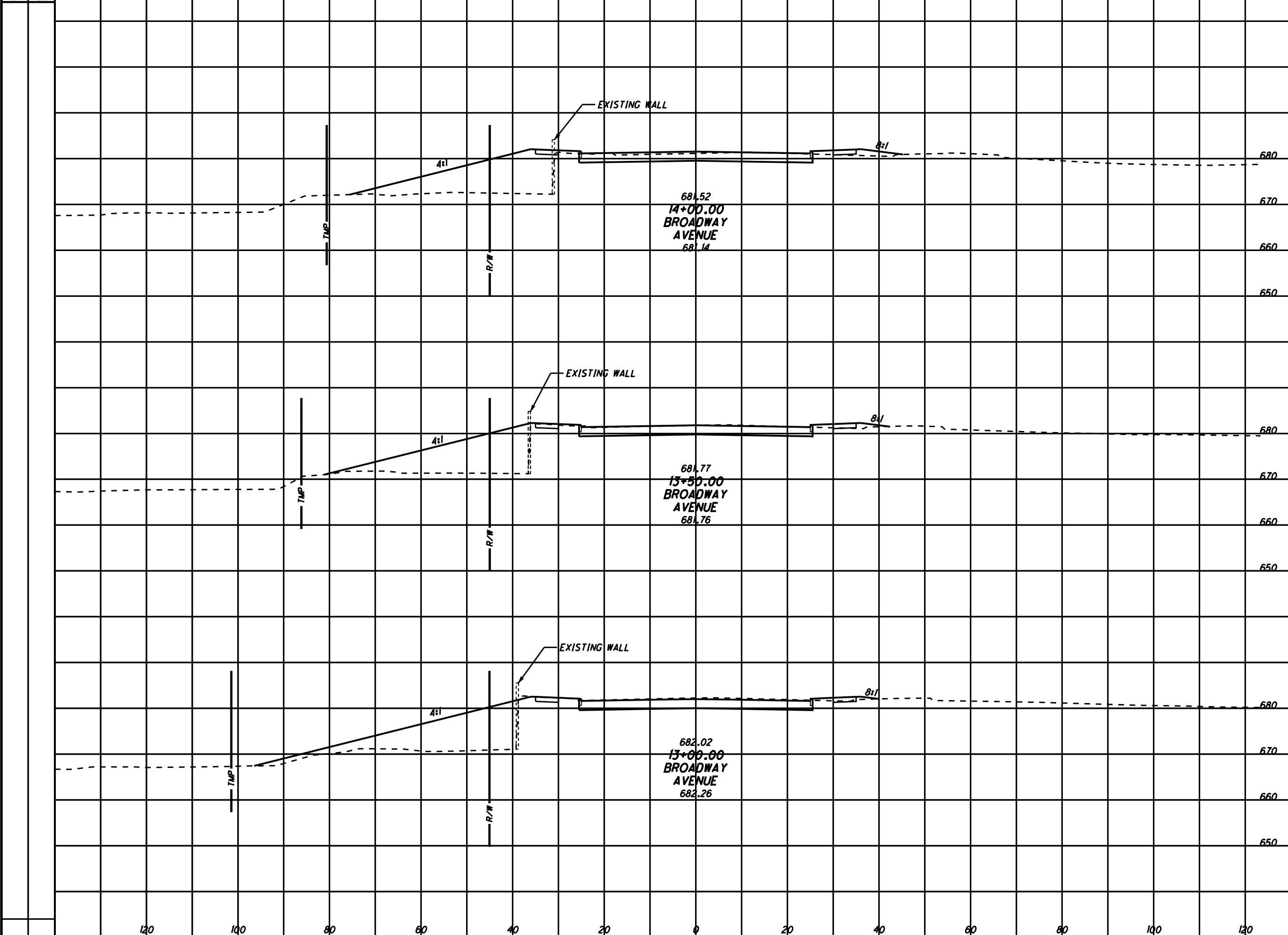


RETAINING WALL JUSTIFICATION STUDY
BROADWAY AVENUE - ATL 2 (STA. 11+50 TO STA. 12+50)

CUY-90-INNERBELT

SEEDING
END WIDTH SO. YDS.

END AREA VOLUME
CUT FILL CUT FILL
CALCULATED CHECKED



RETAINING WALL JUSTIFICATION STUDY
BROADWAY AVENUE - ALT 2 (STA. 13+00 TO STA. 14+00)

CUY-90-INNERBELT

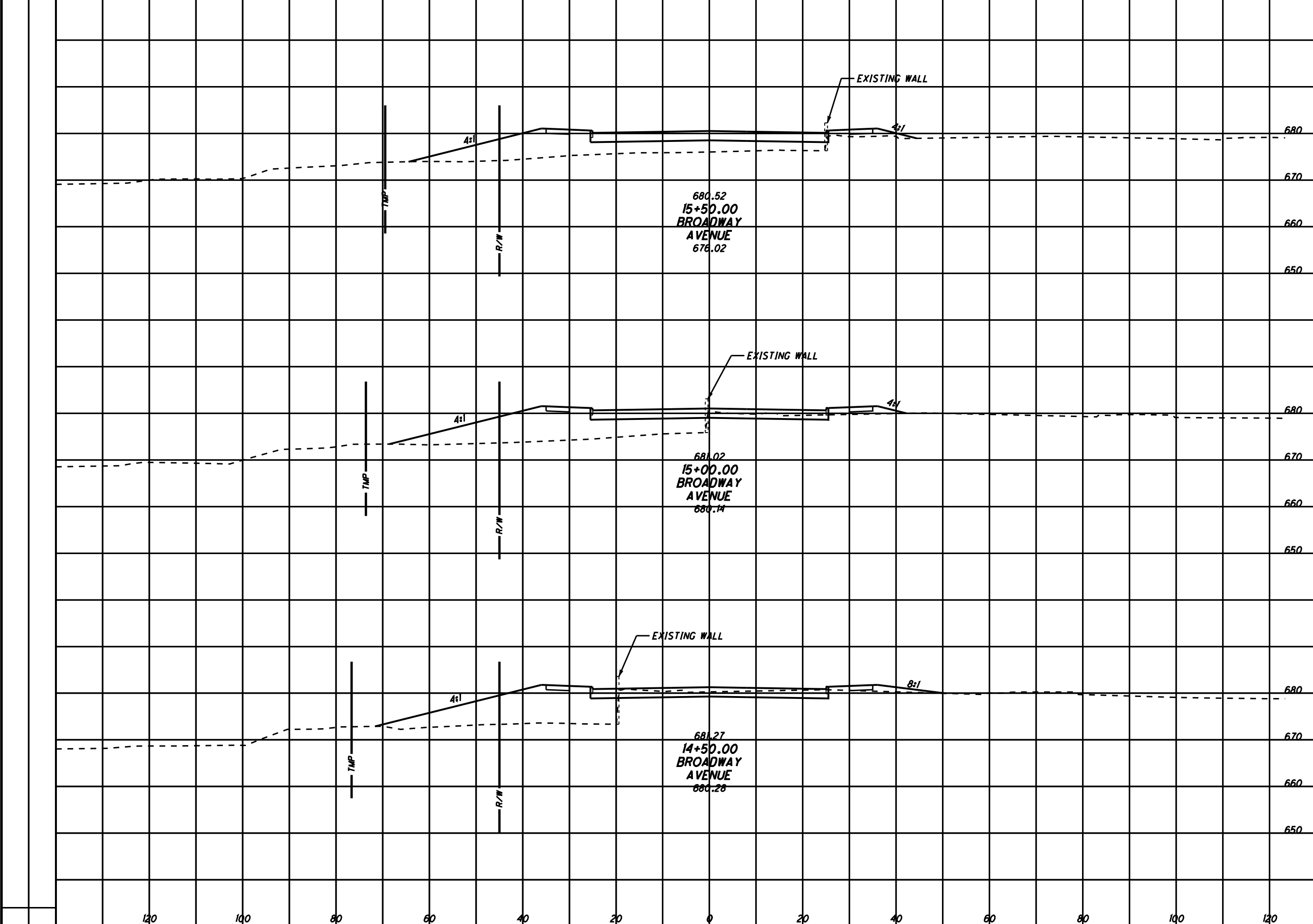
SEEDING

END WIDTH SO. YDS.

END AREA VOLUME

CUT FILL CUT FILL

CALCULATED CHECKED



RETAINING WALL JUSTIFICATION STUDY
BROADWAY AVENUE - ALT 2 (STA. 14+50 TO STA. 15+50)

CUY-90-INNERBELT



120 100 80 60 40 20 0 20 40 60 80 100 120