North Carolina Department of Transportation

Complete Streets Planning and Design Guidelines Appendices

July 2012

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Appendix A Project Development Checklist

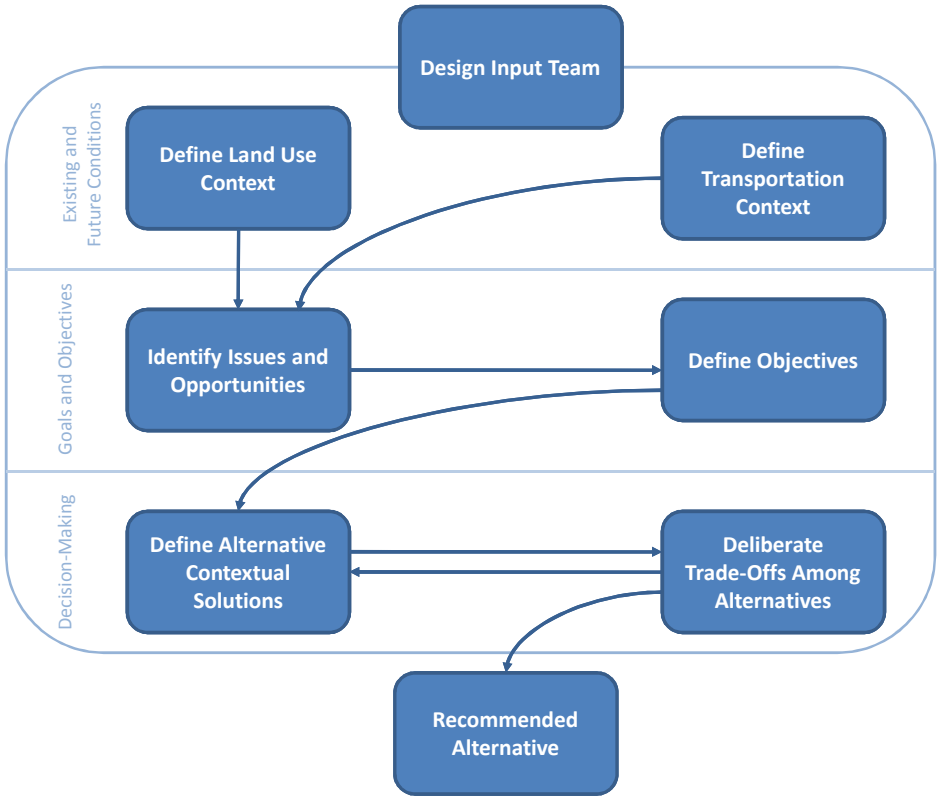
NCDOT Complete Streets Project Development Checklist

Background

Per the 2009 NCDOT Complete Streets Policy, the NCDOT, in its role as stewards over the transportation infrastructure, is committed to:

- Providing an efficient multi-modal transportation network in North Carolina such that the access, mobility, and safety needs of motorists, transit users, bicyclists, and pedestrians of all ages and abilities are safely accommodated;
- Caring for the built and natural environments by promoting sustainable development practices that minimize impacts on natural resources, historic, businesses, residents, scenic and other community values, while also recognizing that transportation improvements have significant potential to contribute to local, regional, and statewide quality of life and economic development objectives;
- Working in partnership with local government agencies, interest groups, and the public to plan, fund, design, construct, and manage complete street networks that sustain mobility while accommodating walking, biking, and transit opportunities safely.

Figure 2: Project Development Process



The following is a checklist that reflects Figure 2 and is intended to document how complete streets have been considered in the planning and design of a project. The design input team formed for the project should complete the appropriate portion of this checklist at each project milestone. This checklist should be used for all projects related to the design, construction or modification of streets.

Evaluation of Existing and Future Conditions

Define Land Use Context: Note: refer to Chapter 3 of the Guidelines for a detailed description of area types)

Existing conditions

- Is this an urban area, a rural area or an area of transition (urban to rural or rural to urban)?

- What is the jurisdiction land use and zoning for the area?

- What is the existing land use mix and density?

- What are the typical building types, their scale, setbacks, urban design characteristics, relation to the street?

Future conditions

- Are there any development pressures on the area? What is the nature of the emerging land use context?

- What is the jurisdiction's future land use vision (as identified in a comprehensive plan, corridor plan, policies, or other sources)?

- Does the adopted plan(s) make specific recommendations regarding density, setbacks, urban design, etc. through the project area?

Define Transportation Context:

Existing conditions

- What is the character of the street? What does the area look and feel like?

- How does the street currently function? What are the daily and hourly traffic volumes? Operating and posted speeds?

- How does this corridor function within the larger transportation network?

  _____
  _____
  _____

- What design features and accommodations for bicyclists, pedestrians and transit users are included on the corridor (number of lanes, sidewalk availability, bicycle facilities, transit service and stops, traffic control, etc.)?

  _____
  _____
  _____

- What is the existing quality of service (safety and accessibility) for each mode? What is the general crash history for motorists, bicyclists, and pedestrians (are there any specific safety issues to be addressed)?

  _____
  _____
  _____

Future conditions

- What are the projected traffic volumes along the corridor?

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  _____
  _____

- What trip generators (existing and future) are in the vicinity of the proposed project that might affect travel patterns and connections in and around the corridor?

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- What are the locally adopted multimodal plans or policies affecting bicycle, pedestrian, or transit use?

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  _____
  _____

- Are there any planned transportation projects in the larger area that would affect the street segment?

  _____
  _____
  _____

Establish Goals and Objectives

Identify Issues and Opportunities:

- What are the deficiencies/problems with the street today?
  - Are there gaps in the bicycle or pedestrian network near or along the street?
  - Are there gaps in the overall street network (connectivity, capacity, etc.)?
  - Are there inconsistencies between the amount or type of transit service provided along the street and the types of facilities and/or land uses adjacent to the street?

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- What are the key opportunities with this project (i.e. a tool for economic development or improved community health, a missing link in the bicycle, pedestrian, or vehicular system, improving the level or quality of service for a particular mode, etc.)?

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Define Objectives:

- How do the local government, community, and all users want the street and neighborhood to change, if at all?

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  _____
  _____

- What are the existing functions that need to remain in place?

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  _____
  _____

- How can those functions be balanced with new users of the street?

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  _____
  _____

- How would this project increase the connectivity of the larger network?

  _____
  _____
  _____

- How would this project improve the mobility and safety of all potential users of the street?

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  _____
  _____

- How would this project meet the needs of the community?

  _____
  _____
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Decision-Making

Develop Alternatives (Note: refer to Chapter 4 of the Guidelines for detailed street typologies):

- How will the proposed project accommodate existing and planned bicycle, pedestrian, and transit facilities?

  _____
  _____
  _____

- What modes does each alternative scenario serve and how?

_____
_____
_____

- How do the alternatives fit within the land use and transportation context and defined objectives?

_____
_____
_____

- How will the alternative scenarios under consideration meet the needs of stakeholders?

_____
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_____

Deliberate Trade-Offs:

All of the scenarios identified should be tested against the land use and transportation context and the objectives for the project to determine any inconsistencies or constraints. The solutions within the alternatives will likely vary. An evaluation and description of trade-offs is required prior to the selection of the recommended alternative. Design plans that are under development allow for comparison of tradeoffs in street cross-sections and the ability of the alternatives to meet identified objectives, etc. At the end of the deliberation process, the reasons behind the selected cross-section should be transparent and understood. Therefore, describe the trade-offs made, if any, and how they have been evaluated. Items to be considered include but are not limited to:

- Consistency with local context, land use and transportation plans and policies, and project objectives, as defined through this process;
- Balanced modal capability (to achieve functionality for all users);
- Accessibility to achieve functionality for all users;
- Right-of-way availability;
- Environmental (natural and human) considerations;
- Overall costs; and
- Any other considerations specific to this project.

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Recommended Alternative:

- Once trade-offs have been evaluated and described among alternatives, the team will come to a recommended alternative. Describe how the recommended alternative reflects the ultimate design for the project:

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Appendix B At-Grade Rail Crossings

NC DEPARTMENT OF TRANSPORTATION

RAIL DIVISION

ENGINEERING AND SAFETY BRANCH
CAPITAL YARD
1556 MAIL SERVICE CENTER
RALEIGH, NC 27699-1556

COMPLETE STREETS
TYPICAL HIGHWAY SECTIONS AT RAILROAD CROSSING

LEGEND:

SW – SIDEWALK
BL – BIKE LANE
EB – EARTH BERM
C&G – CURB & GUTTER

NOTES:

1. PARKING SHALL NOT BE ALLOWED IN RAILROAD R/W.
   TAPER EXISTING PARKING LANE FROM SECTION A–A TO SECTION B–B.

2. PROVIDE 50'X100' SIGHT TRIANGLES.
   SIGHT TRIANGLES ARE MEASURED FROM CENTERLINE OF TRACK.

3. SIDEWALK WILL BE ASPHALT WITHIN 13' OF RAILROAD CENTERLINE.

4. THE RAILROAD'S REQUIREMENT FOR MAXIMUM GATE LENGTH WILL DETERMINE
   THE LOCATION OF THE SIDEWALK (BACK OF CURB OR BACK OF EB).

5. SIDEWALK TAPER LENGTH SHOULD BE A MINIMUM OF 20:1.

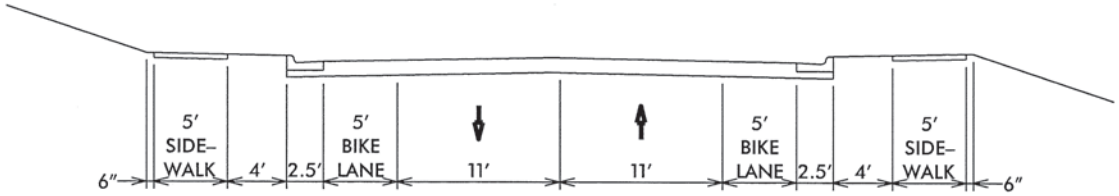
6. TYPICAL SECTIONS SHOULD MATCH THE ROADWAY TYPICAL SECTION.

7. ADA DETECTABLE WARNING DOMES SHALL BE PROVIDED IN THE SIDEWALK
   17' FROM THE RAILROAD CENTERLINE. (SEE DOME SPECIFICATION FOR DIMENSIONS.)

09/01/2011

SHEET 1 OF 26

2 LANE HIGHWAY
CURB AND GUTTER WITH BIKE LANES
AND OFFSET SIDEWALK



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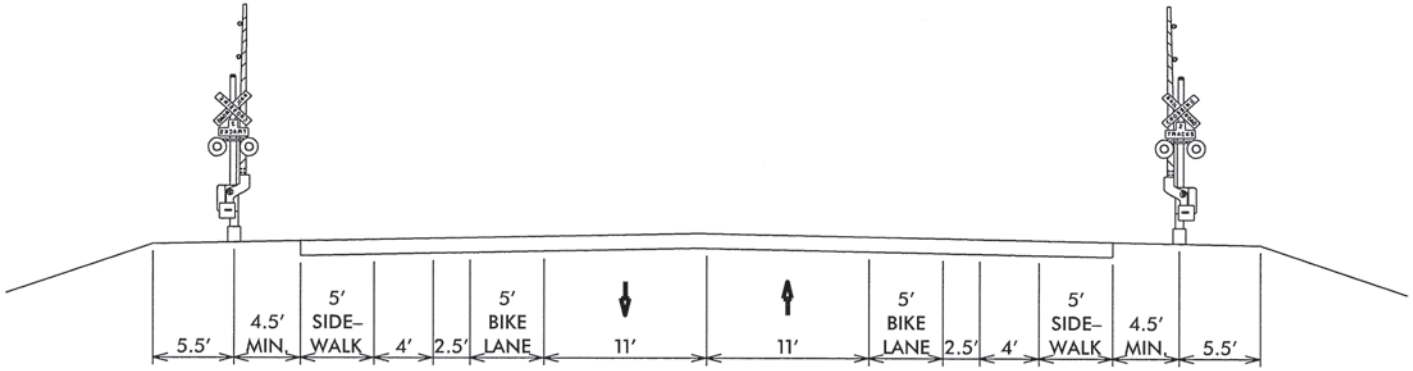

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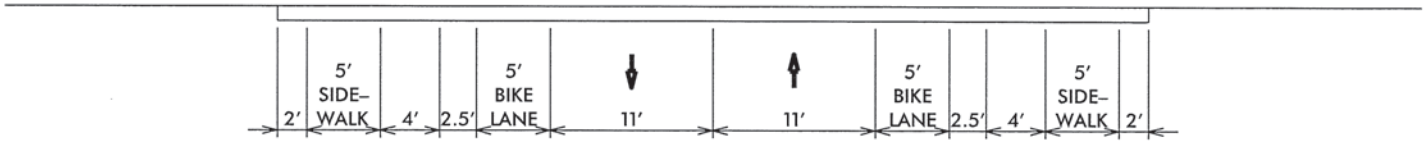

SECTION C–C

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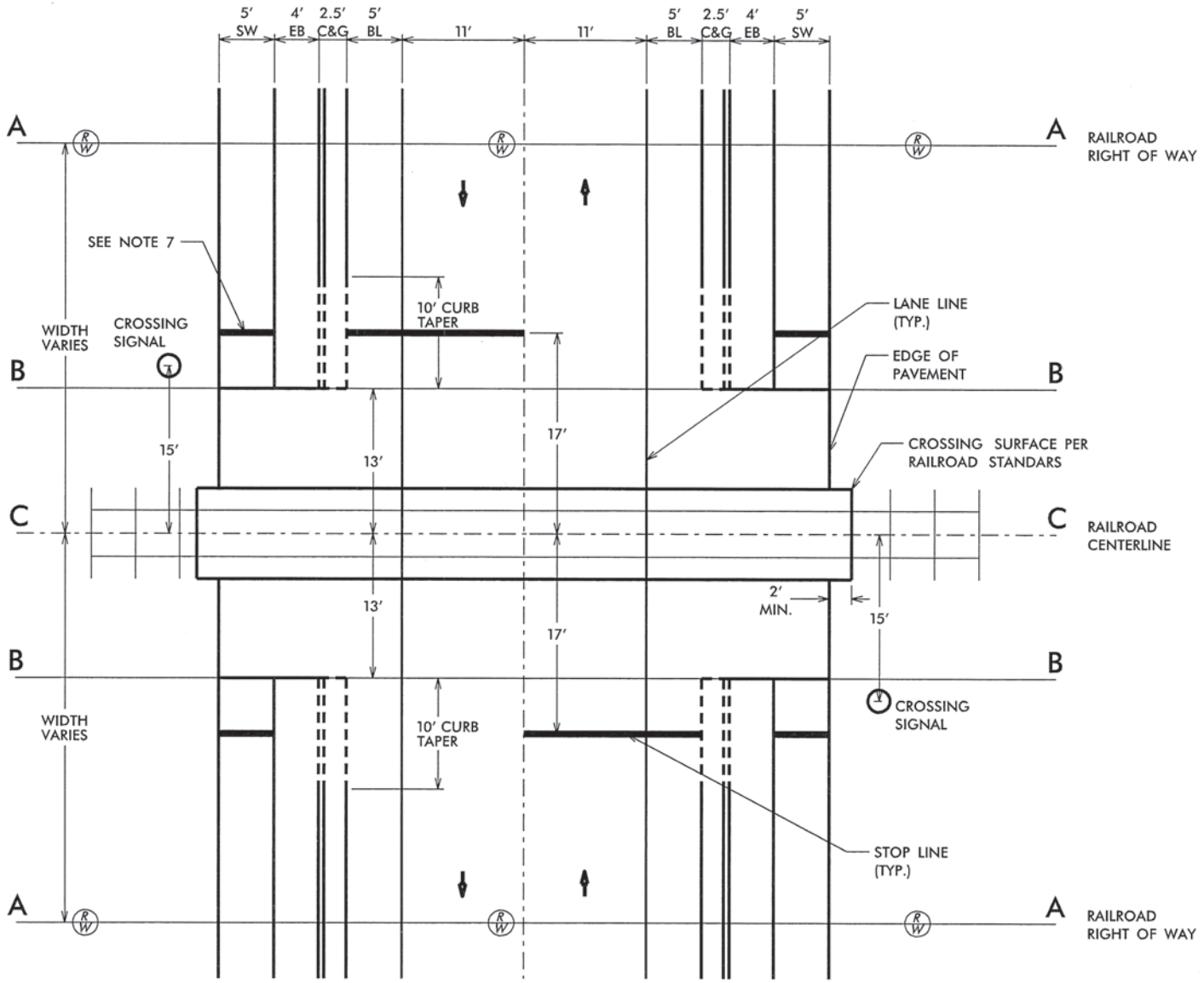
SHEET 2 OF 26

2 LANE HIGHWAY
CURB AND GUTTER WITH BIKE LANES
AND OFFSET SIDEWALK



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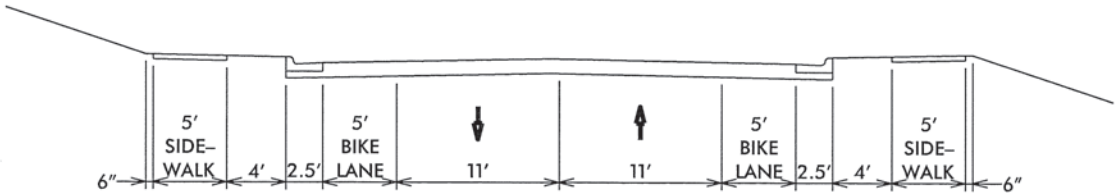
SHEET 3 OF 26

2 LANE HIGHWAY
CURB AND GUTTER WITH BIKE LANES
AND TAPERED SIDEWALK



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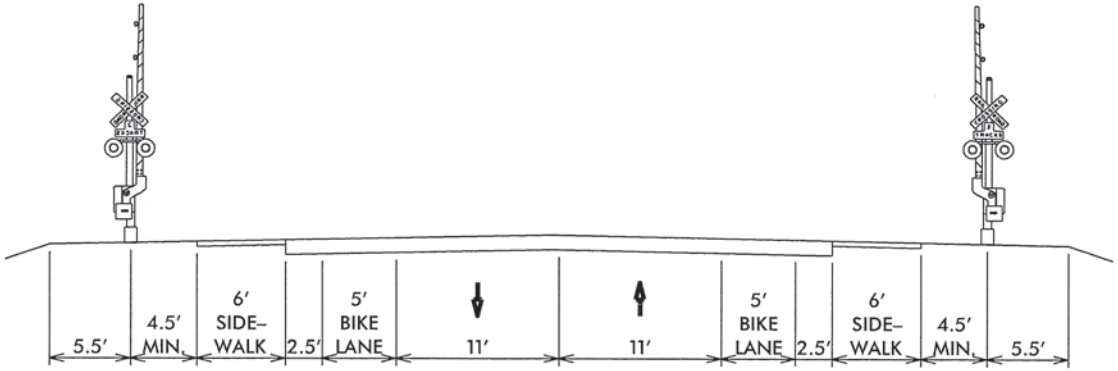

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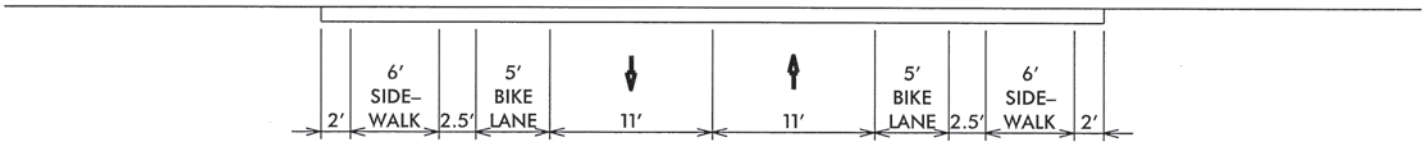

SECTION C–C

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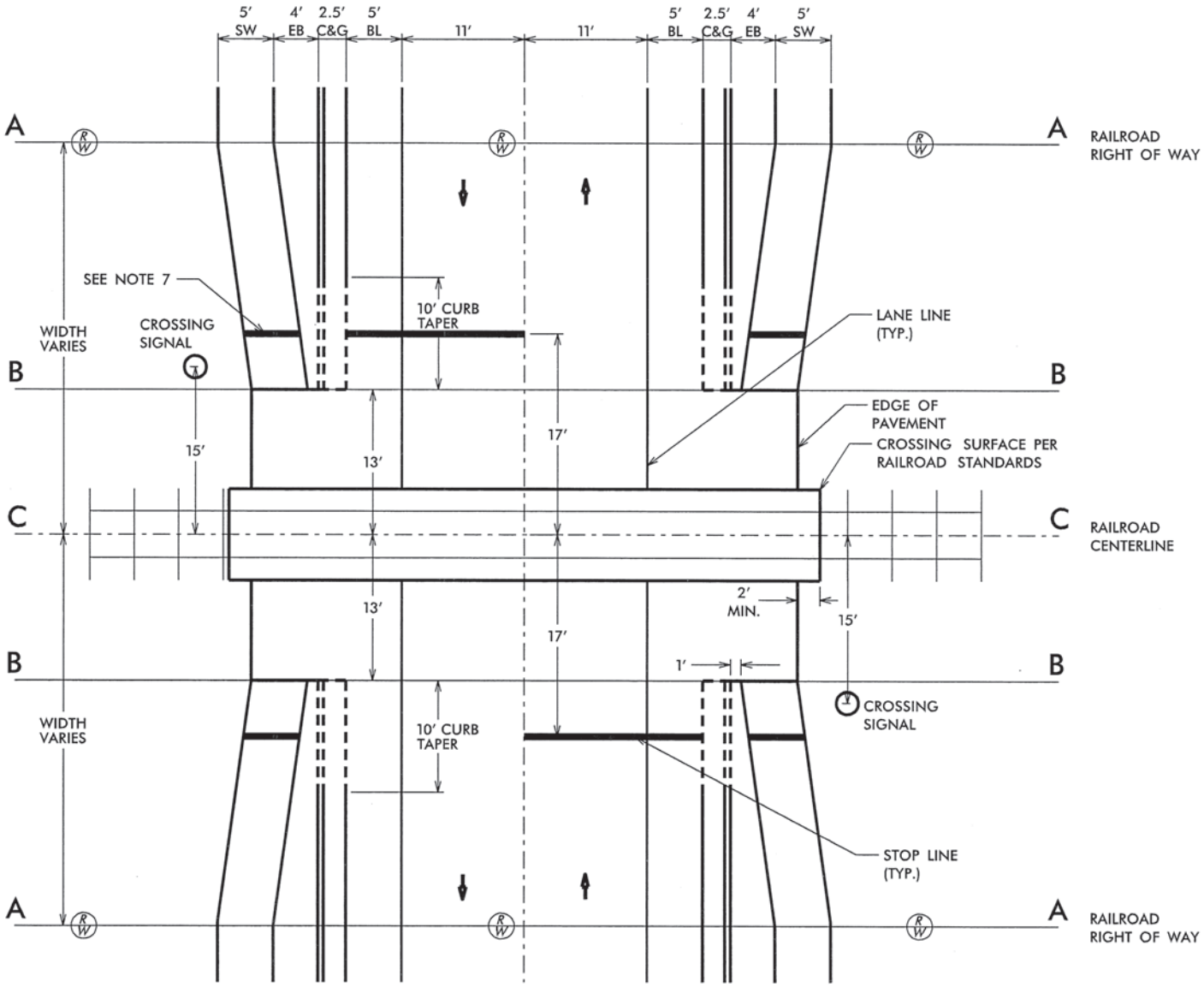
SHEET 4 OF 26

2 LANE HIGHWAY
CURB AND GUTTER WITH BIKE LANES
AND TAPERED SIDEWALK



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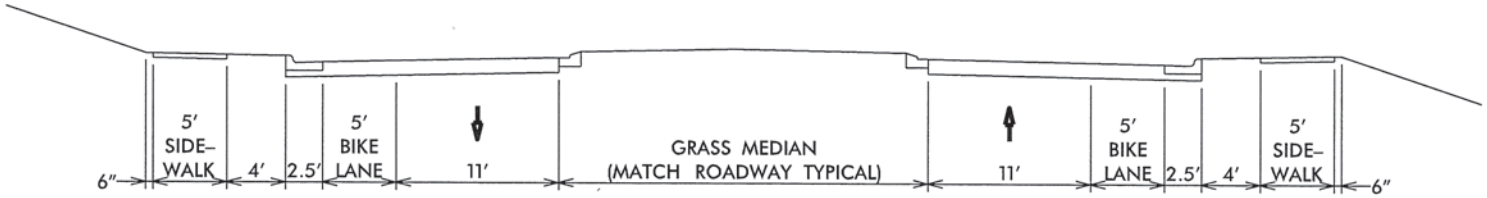
SHEET 5 OF 26

2 LANE HIGHWAY WITH MEDIAN
CURB AND GUTTER WITH BIKE LANES
AND OFFSET SIDEWALK



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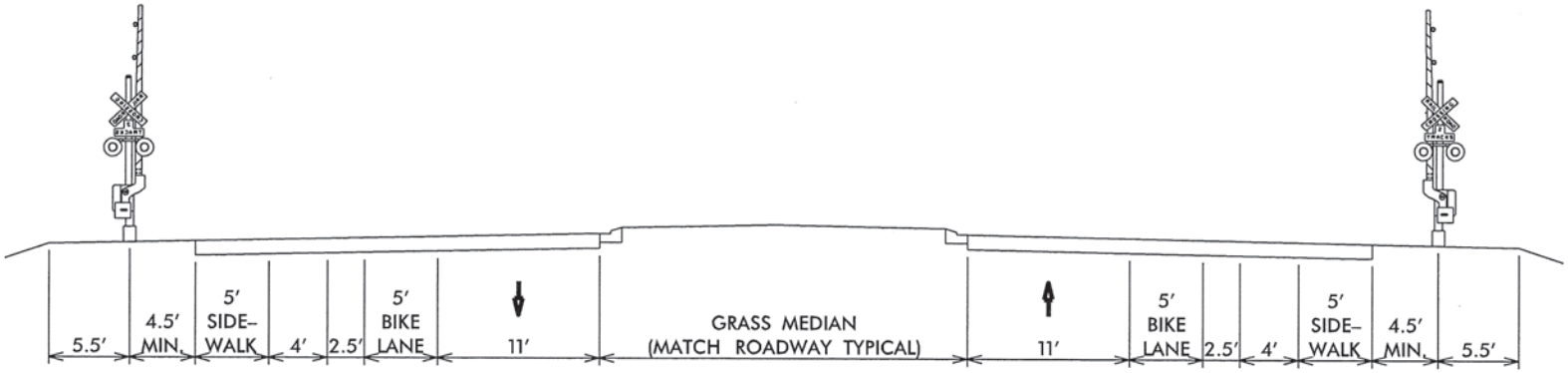

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SECTION C–C

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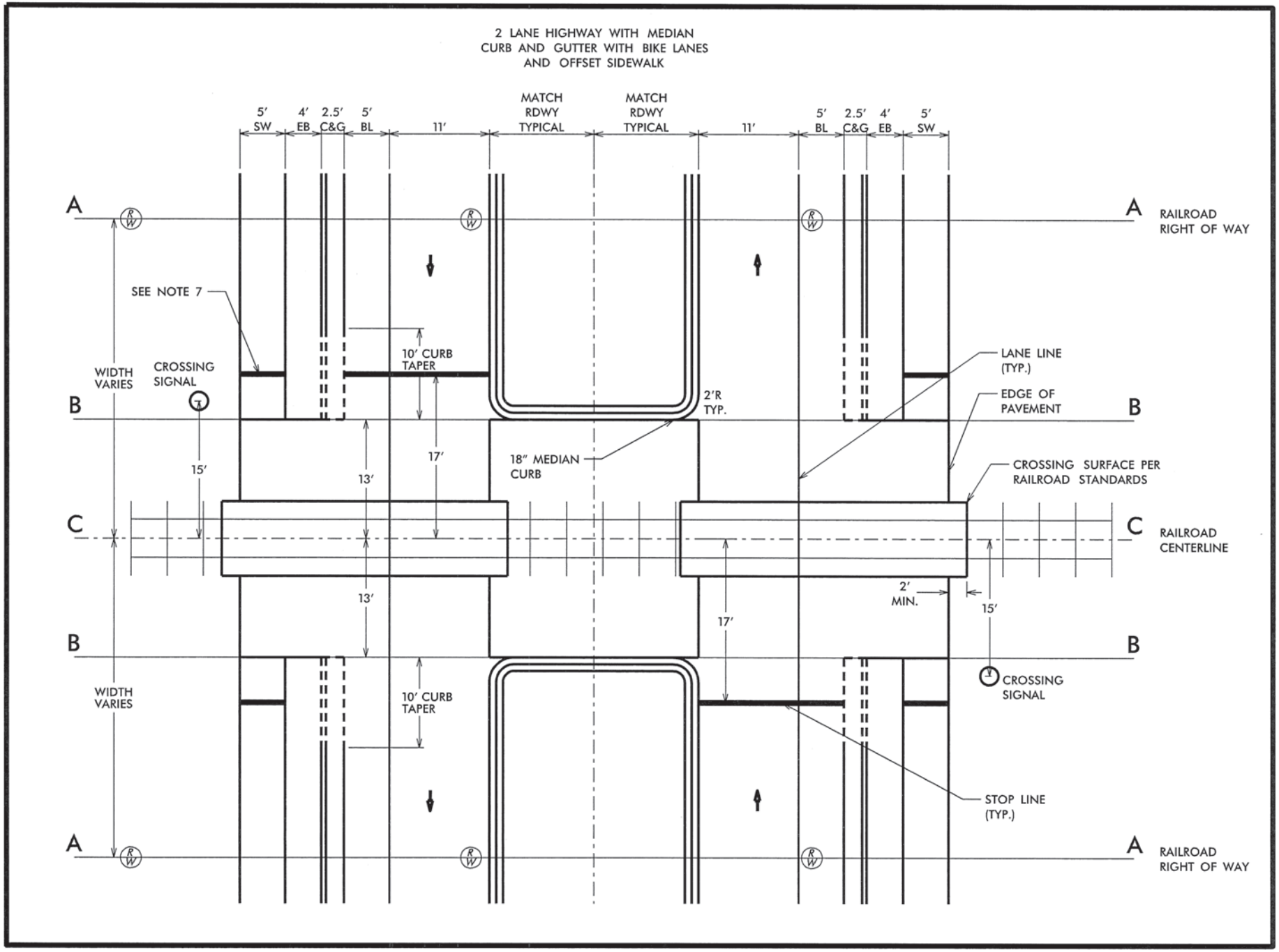

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SHEET 7 OF 26

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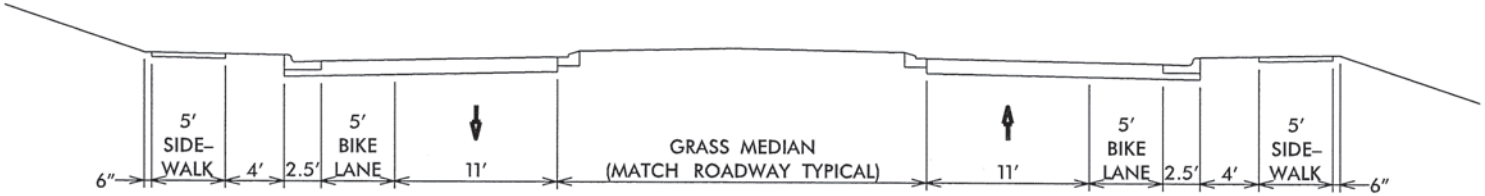
CURB AND GUTTER WITH BIKE LANES
AND TAPERED SIDEWALK



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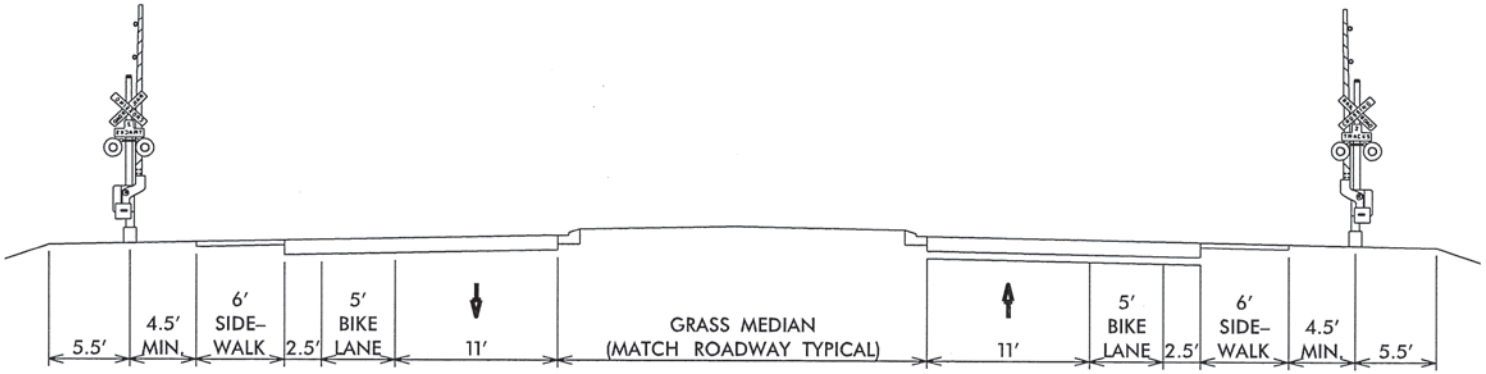

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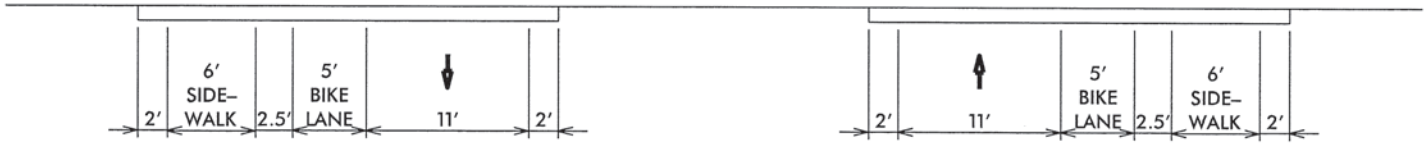

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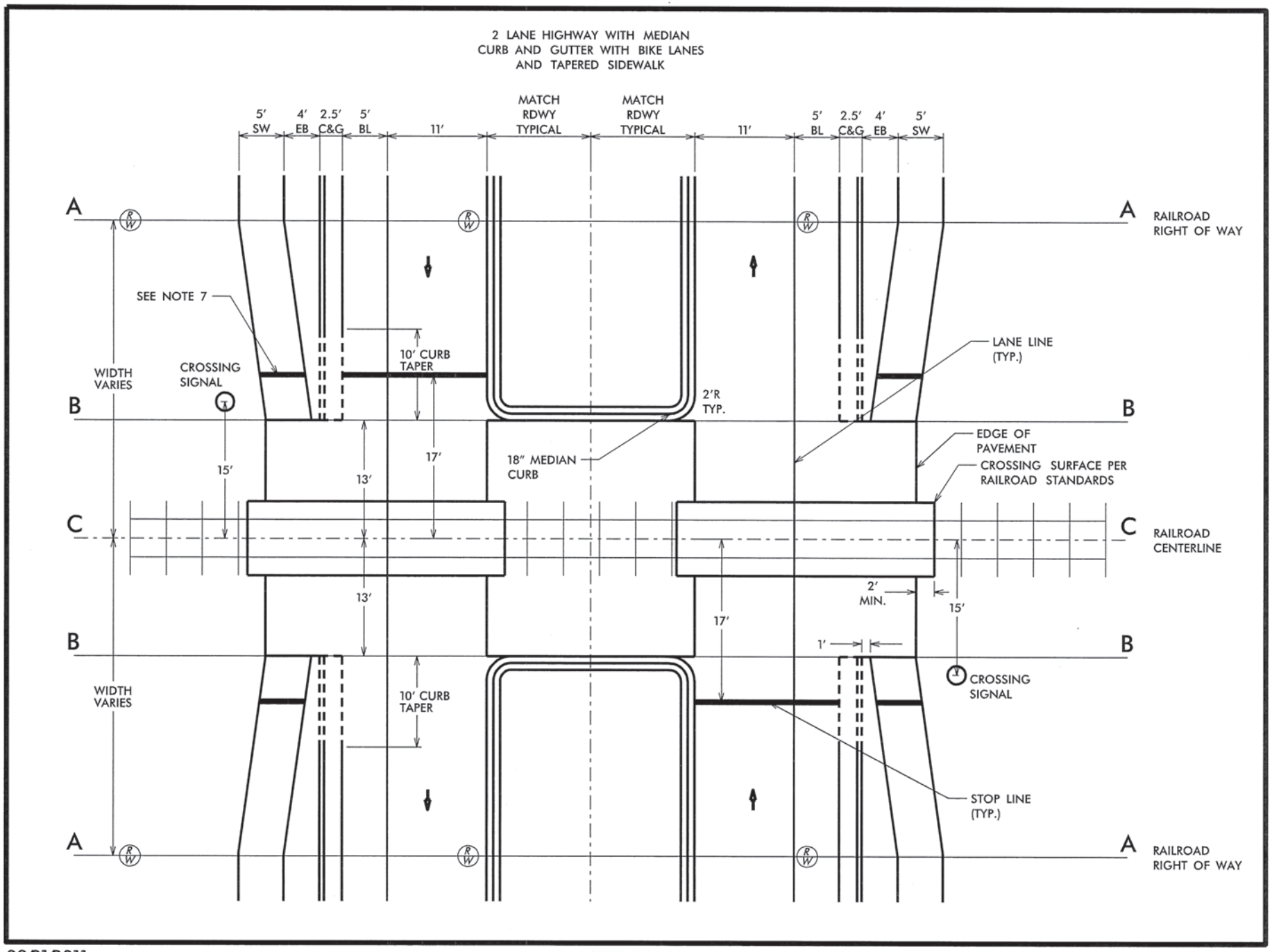

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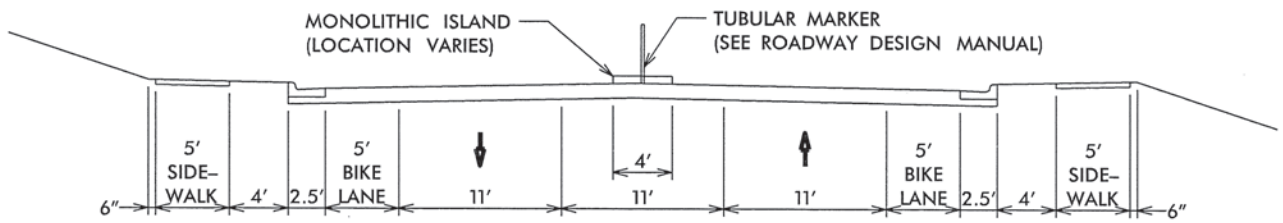
SHEET 9 OF 26

2 LANE WITH CENTER TURN LANE
CURB AND GUTTER WITH BIKE LANES
AND OFFSET SIDEWALK



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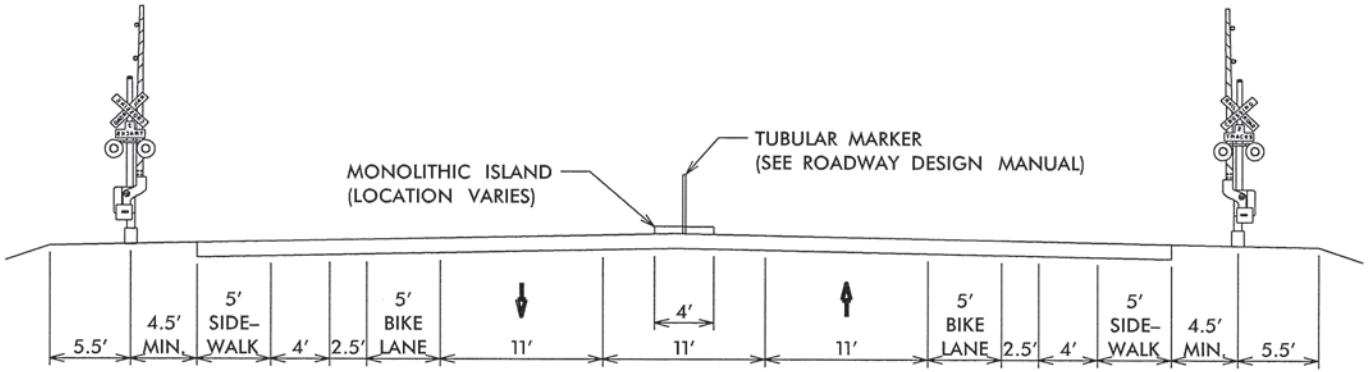

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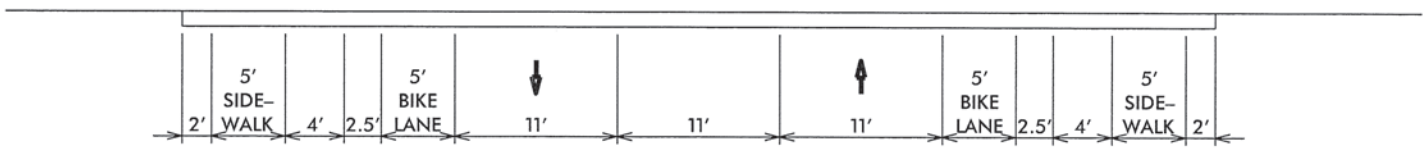

SECTION C–C

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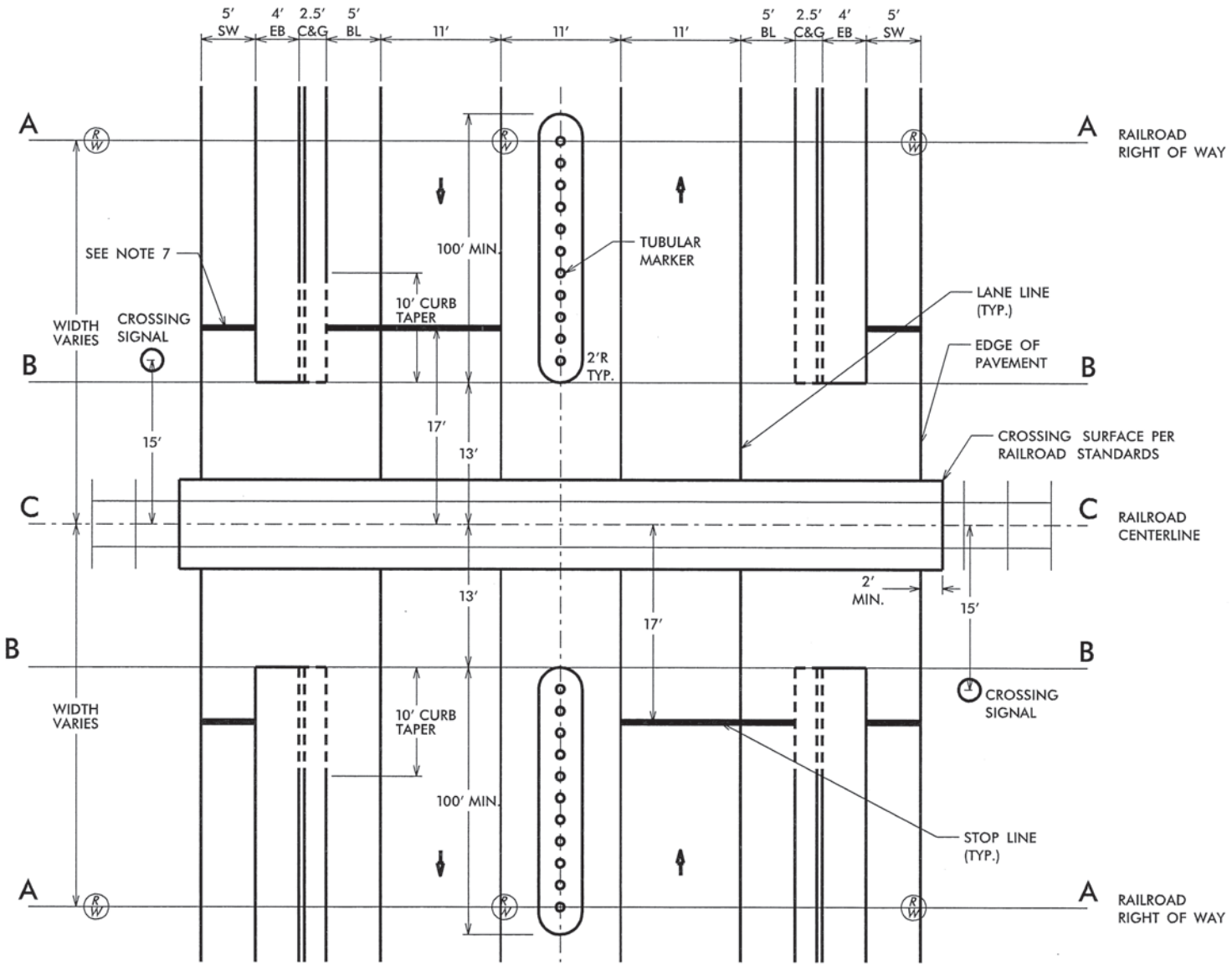
SHEET 10 OF 26

2 LANE WITH CENTER TURN LANE
CURB AND GUTTER WITH BIKE LANES
AND OFFSET SIDEWALK



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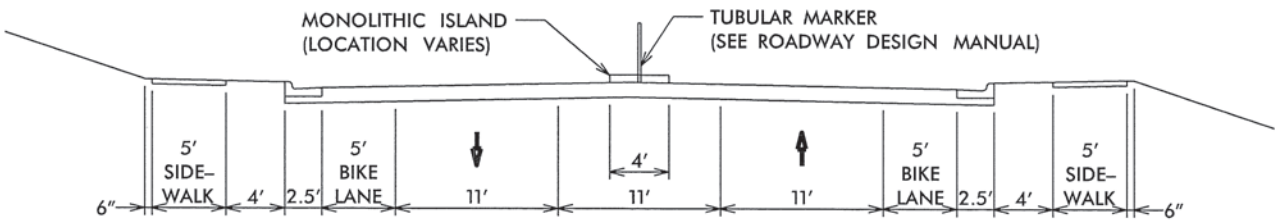
SHEET 11 OF 26

2 LANE WITH CENTER TURN LANE
CURB AND GUTTER WITH BIKE LANES
AND TAPERED SIDEWALK



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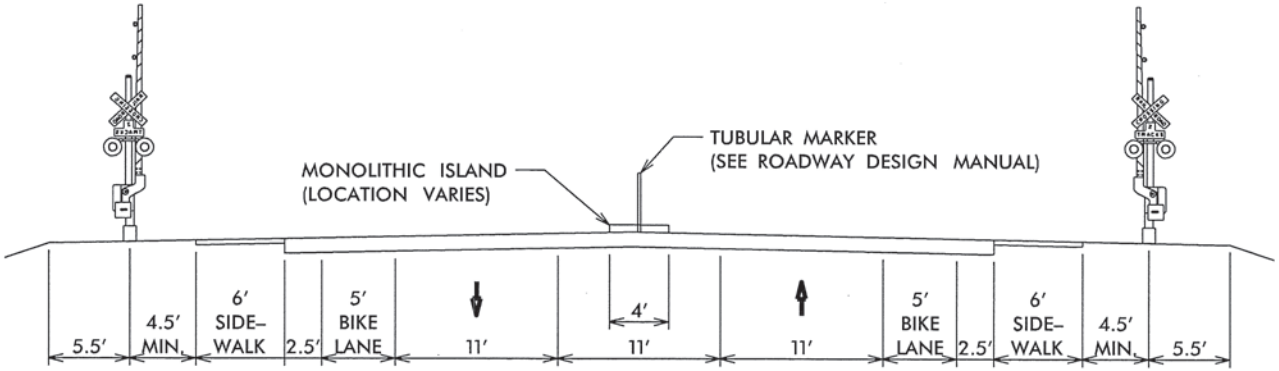

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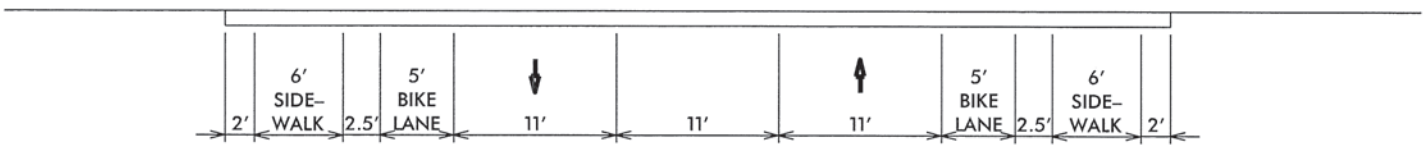

SECTION C–C

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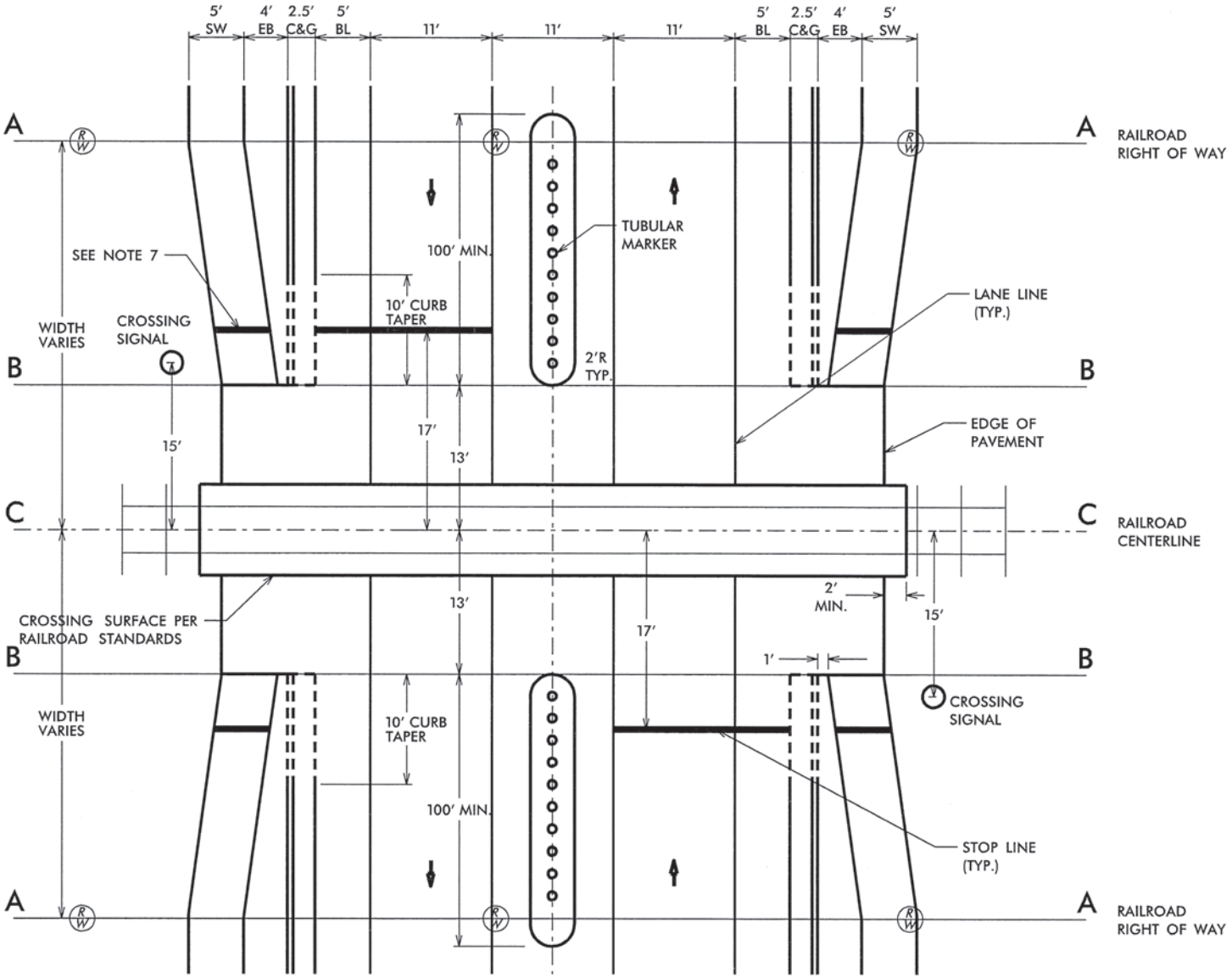
SHEET 12 OF 26

2 LANE WITH CENTER TURN LANE
CURB AND GUTTER WITH BIKE LANES
AND TAPERED SIDEWALK



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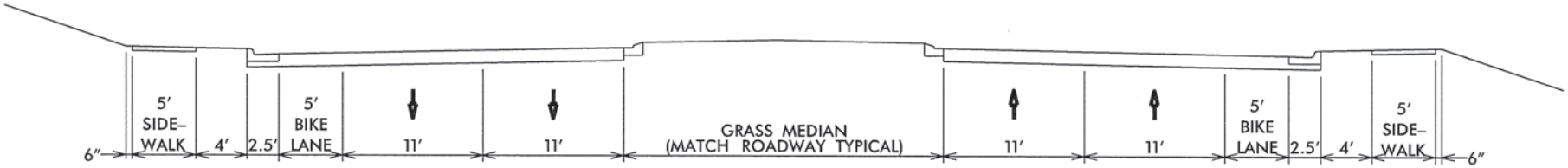
SHEET 13 OF 26

4 LANE WITH MEDIAN
CURB AND GUTTER WITH BIKE LANES
AND OFFSET SIDEWALK



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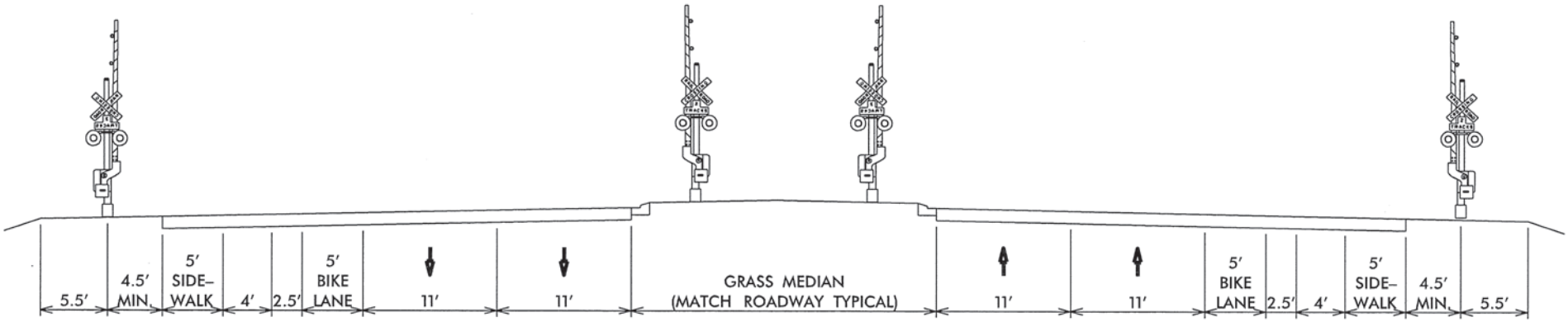

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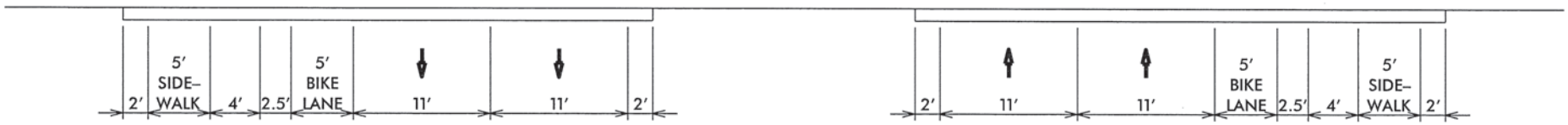

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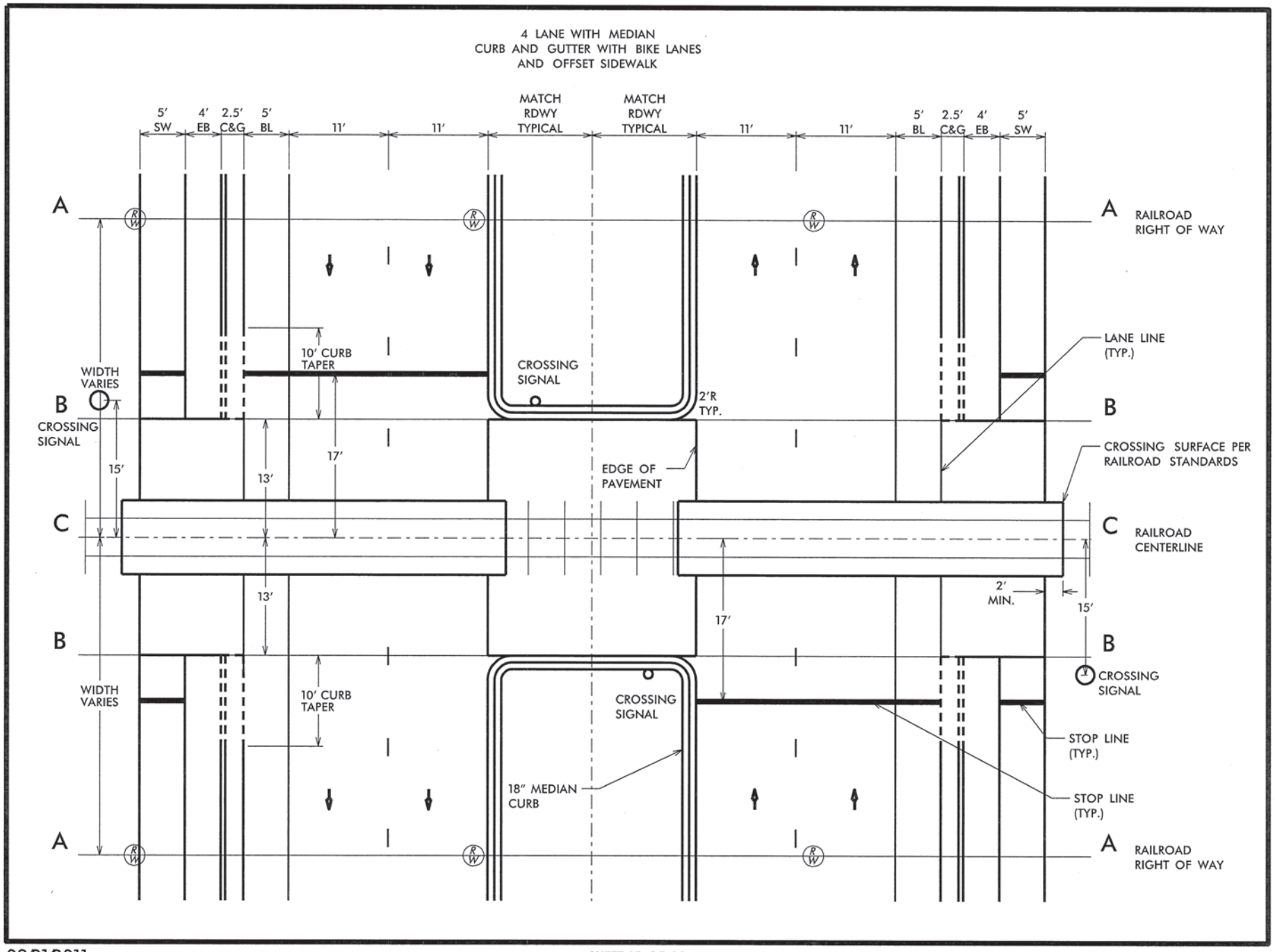

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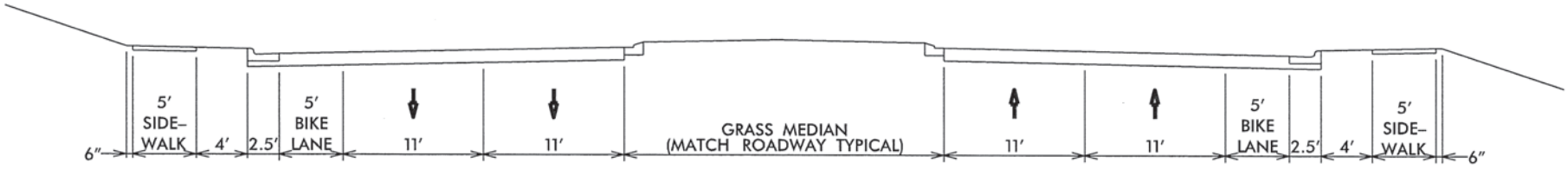
SHEET 15 OF 26

4 LANE WITH MEDIAN
CURB AND GUTTER WITH BIKE LANES
AND TAPERED SIDEWALK



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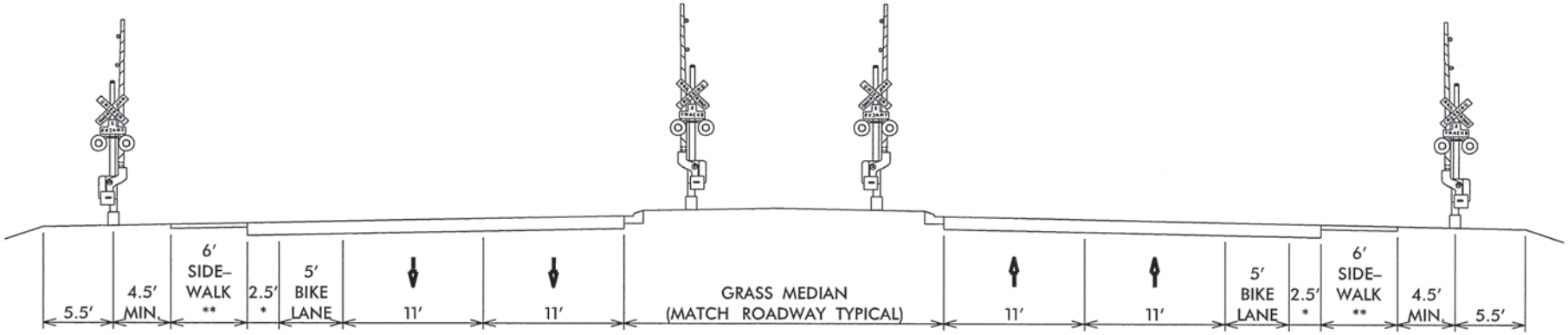

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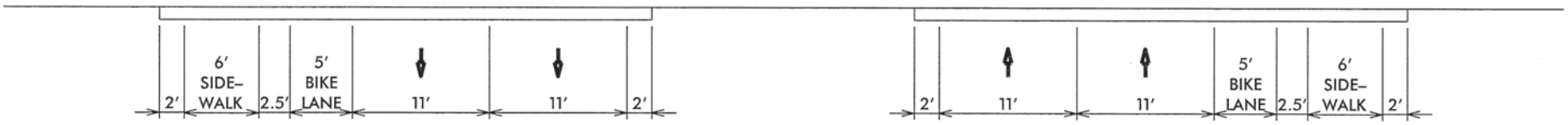

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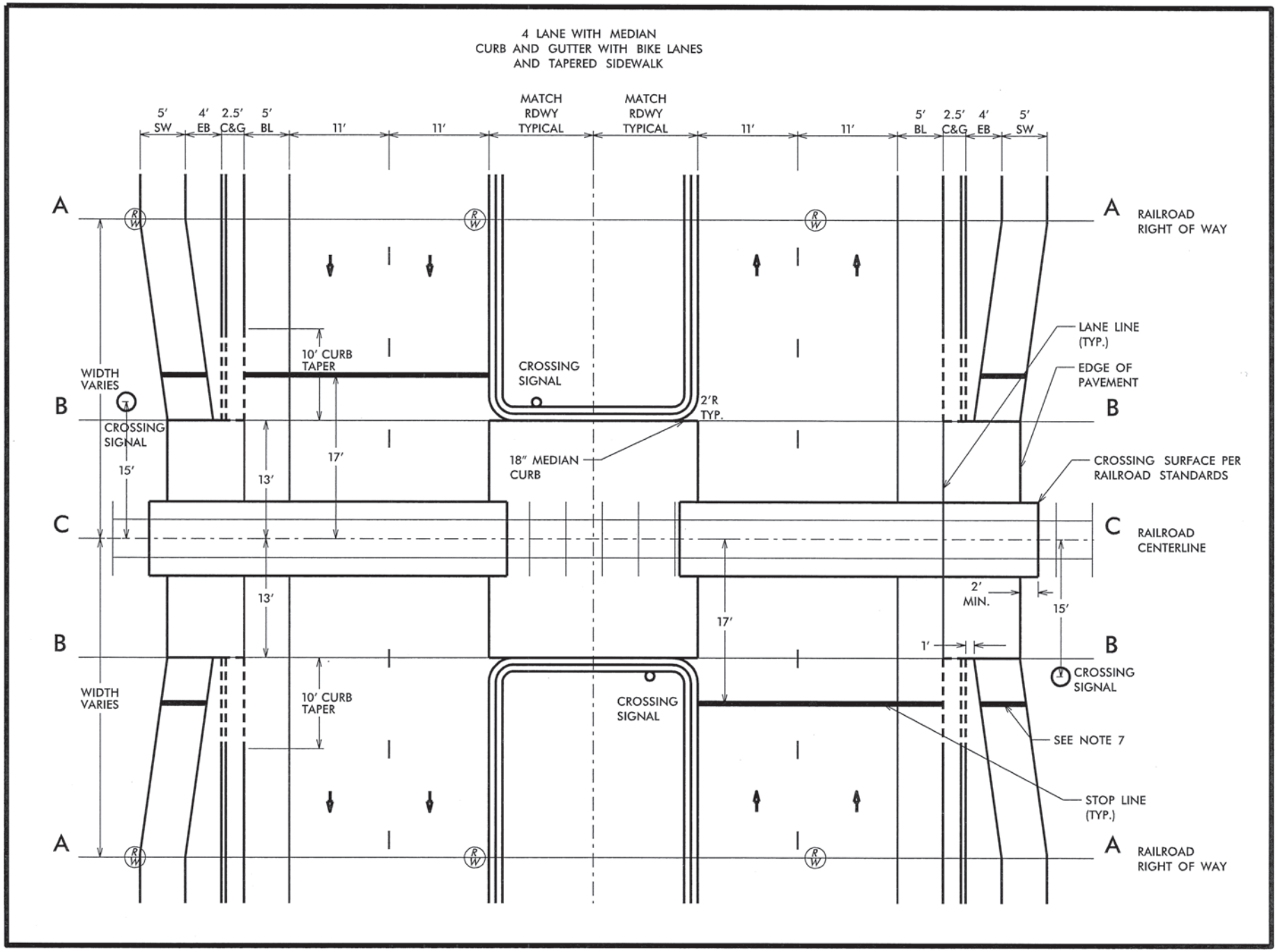

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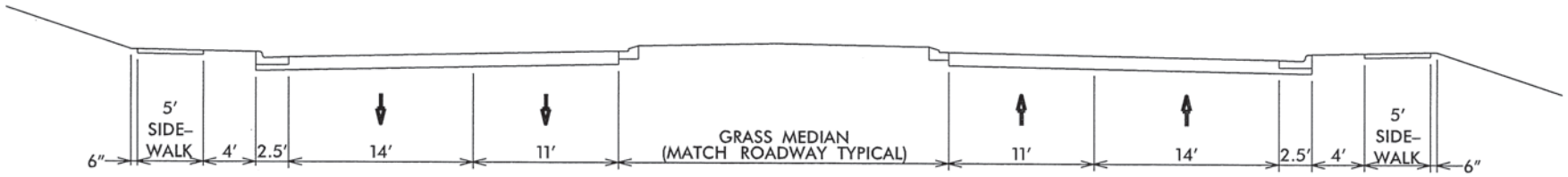
SHEET 17 OF 26

4 LANE WITH MEDIAN
CURB AND GUTTER WITH WIDE OUTSIDE LANE
AND OFFSET SIDEWALK



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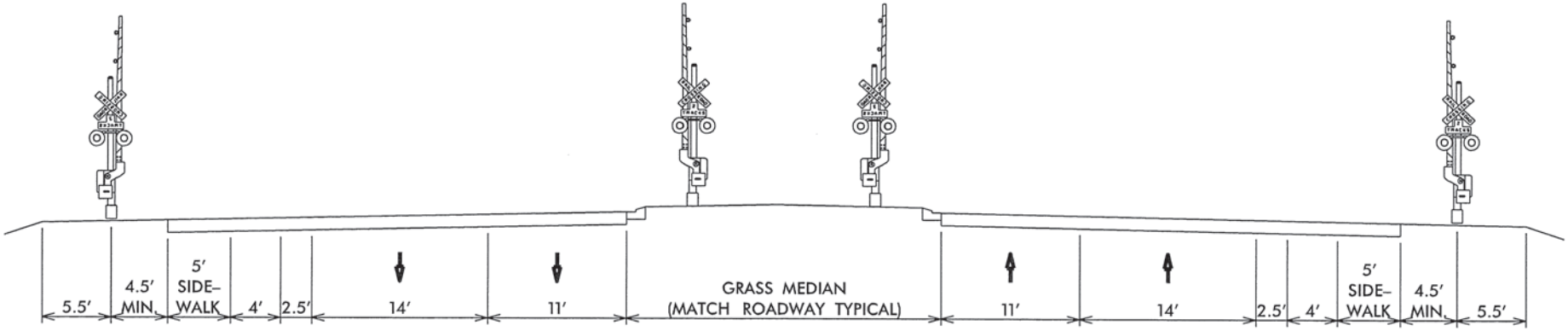

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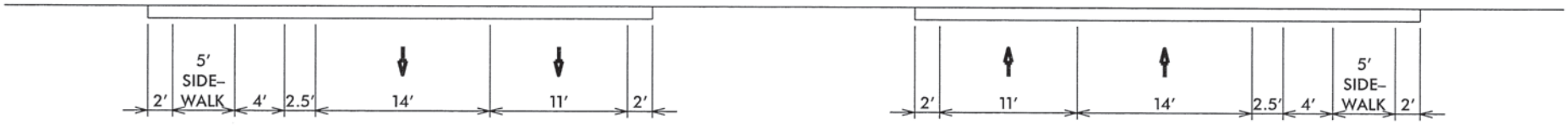

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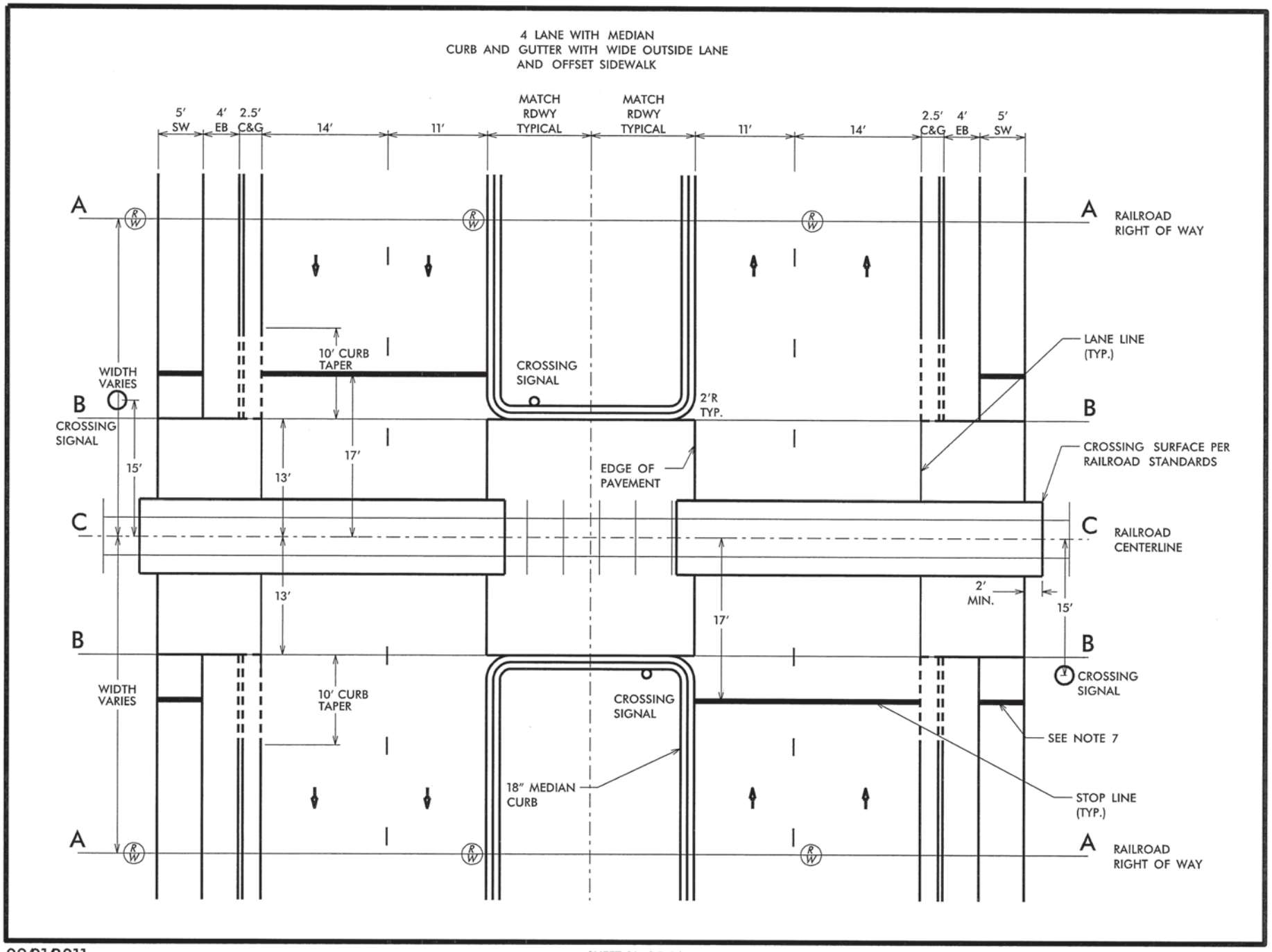

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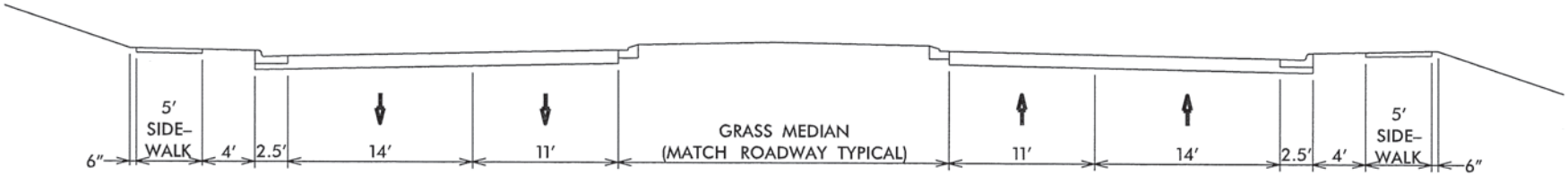
SHEET 19 OF 26

4 LANE WITH MEDIAN
CURB AND GUTTER WITH WIDE OUTSIDE LANE
AND TAPERED SIDEWALK



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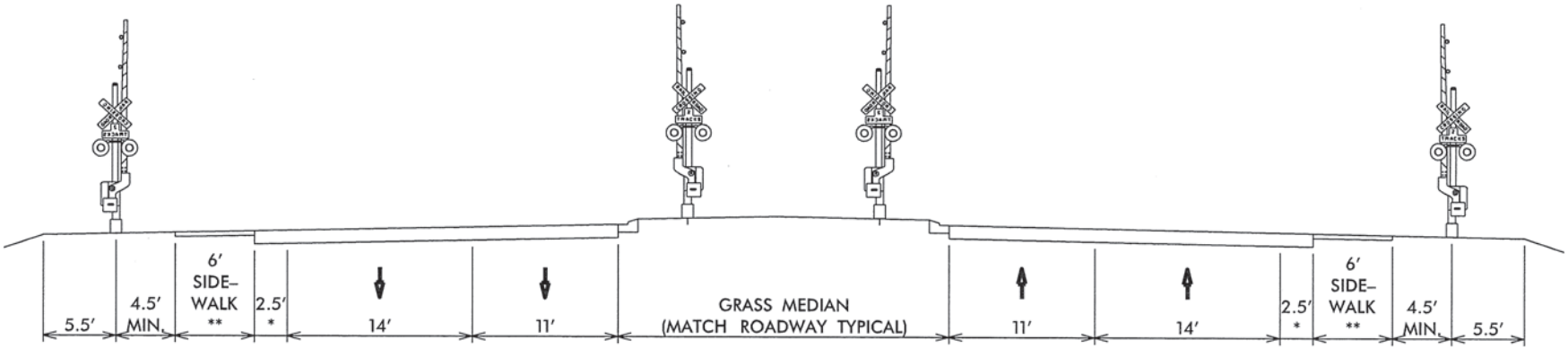
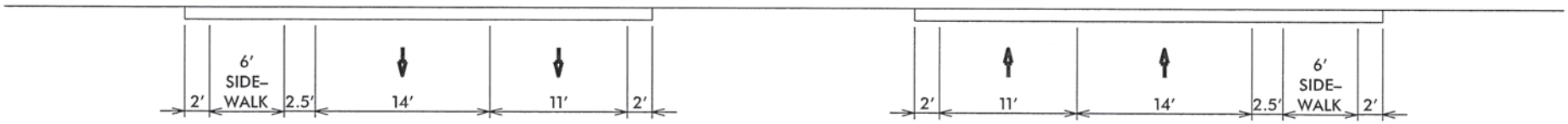


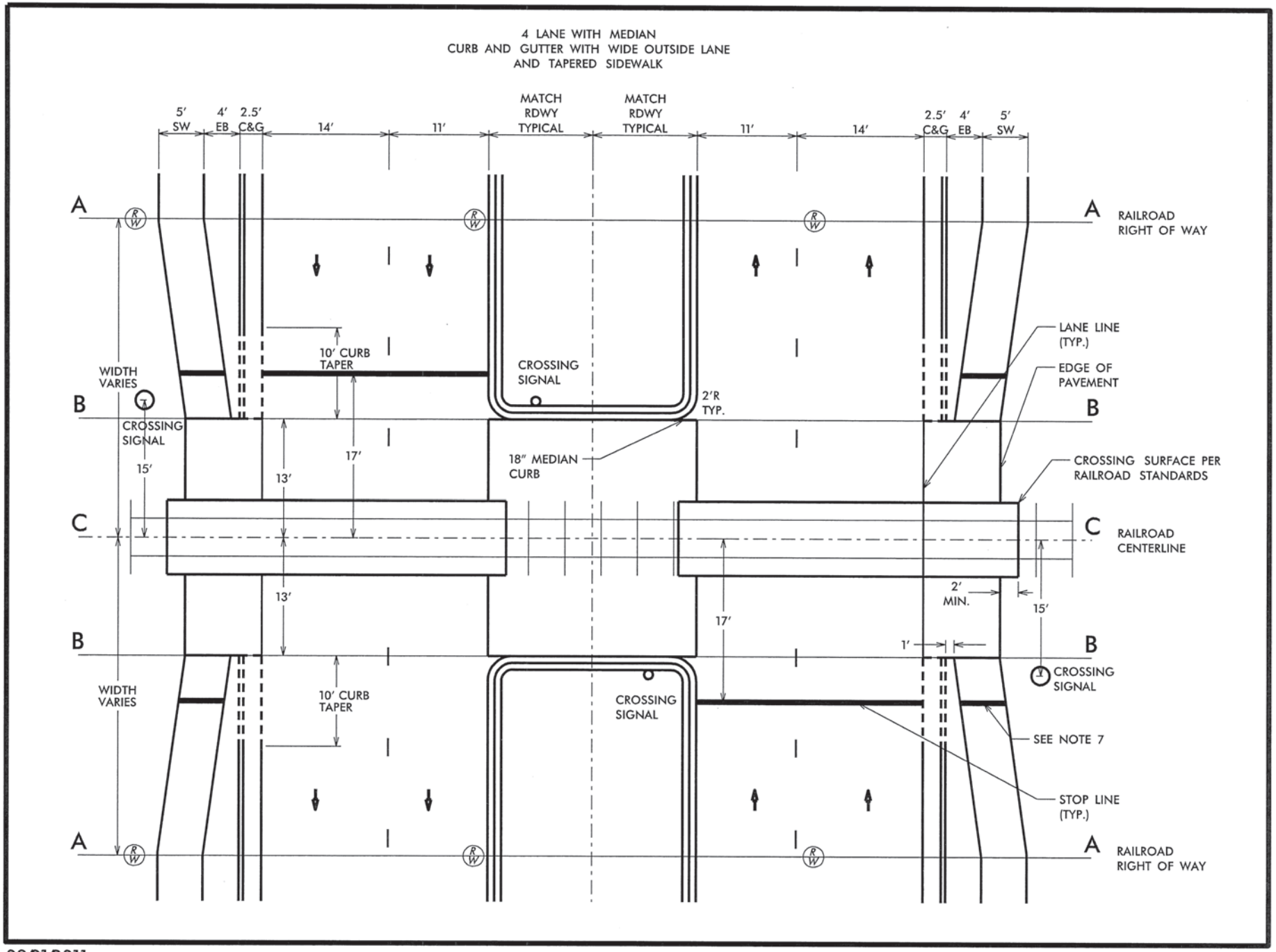
SECTION B–B



SECTION C–C

09/01/2011

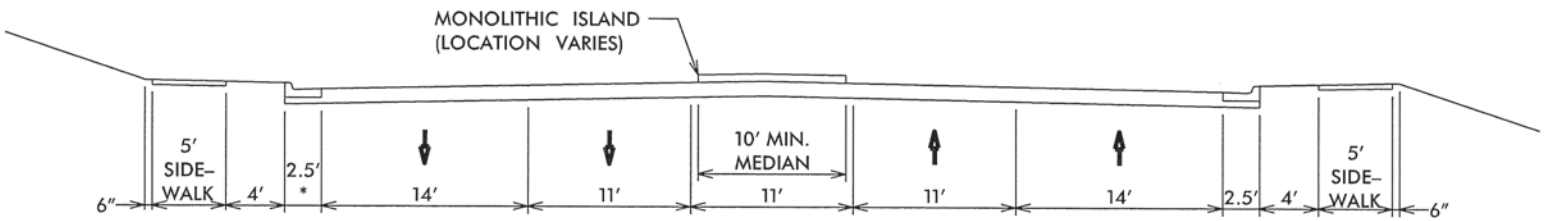
SHEET 20 OF 26



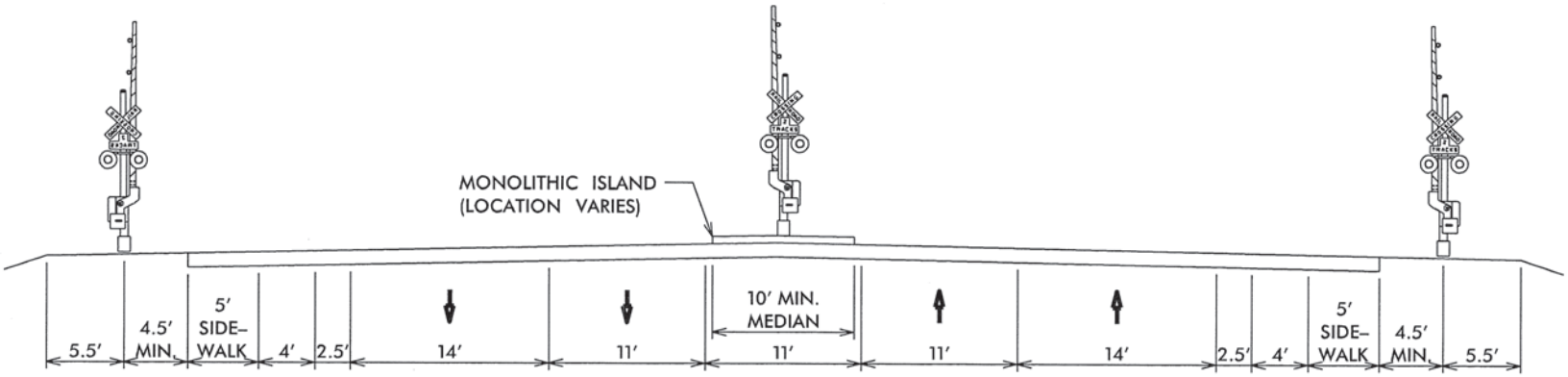
09/01/2011

SHEET 21 OF 26

5 LANE WITH CENTER TURN LANE
CURB AND GUTTER WITH WIDE OUTSIDE LANE
AND OFFSET SIDEWALK



SECTION A–A



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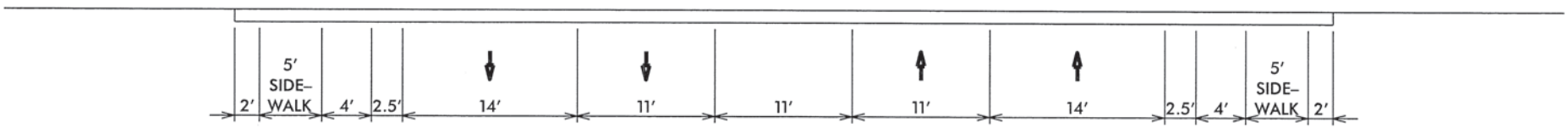
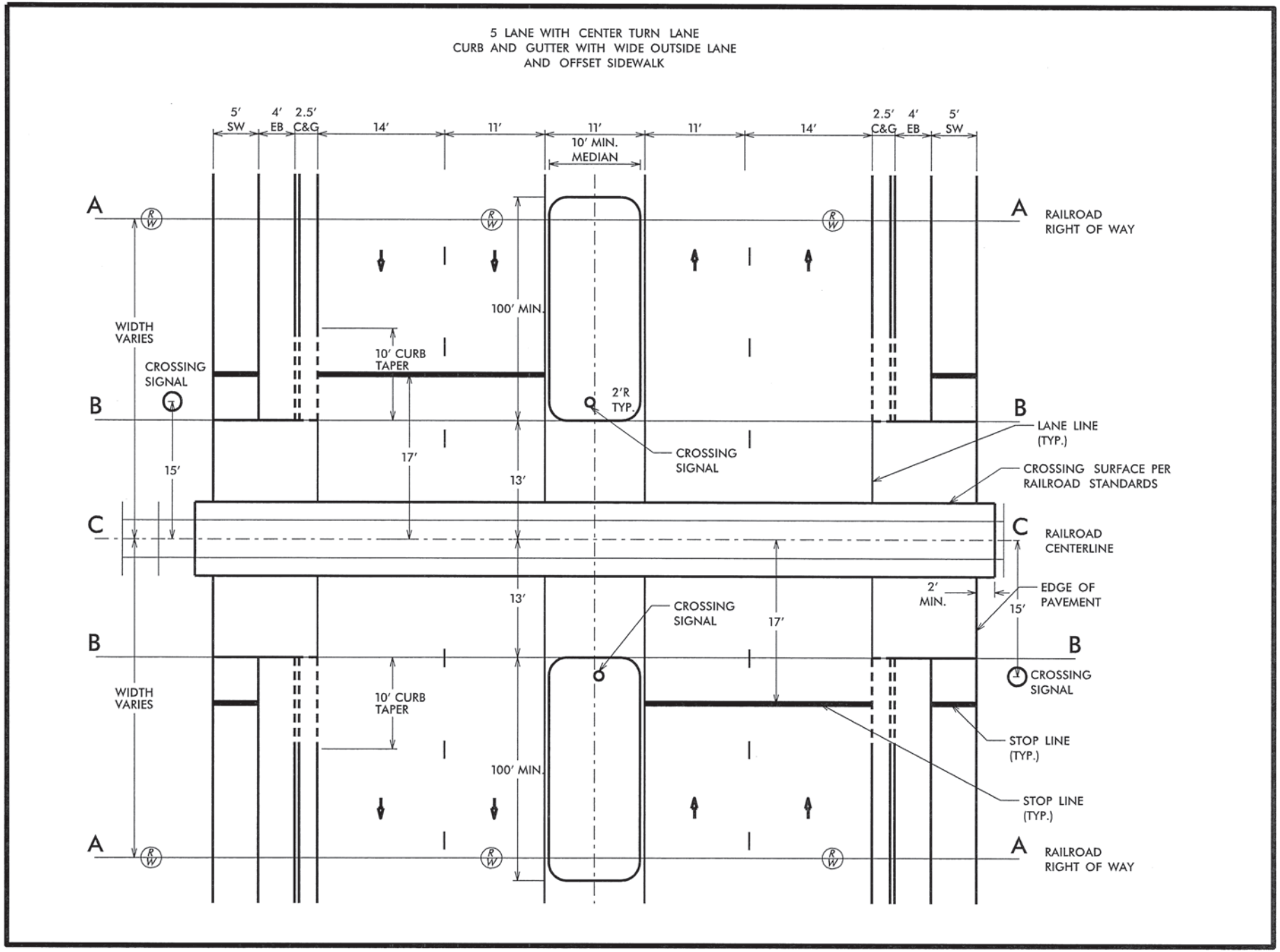


SECTION C–C

09/01/2011

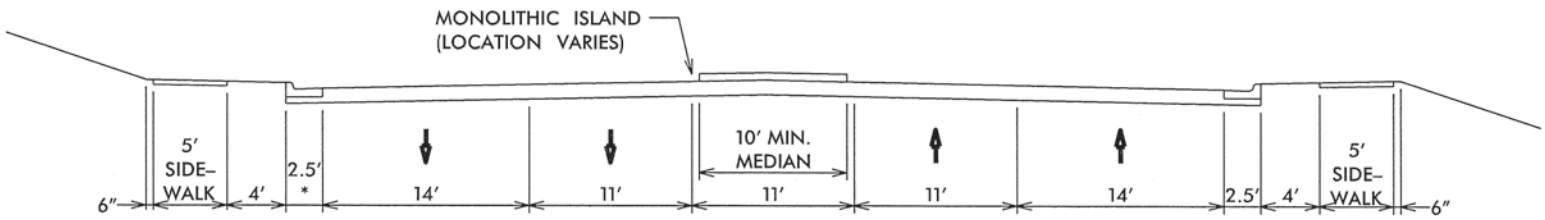
SHEET 22 OF 26



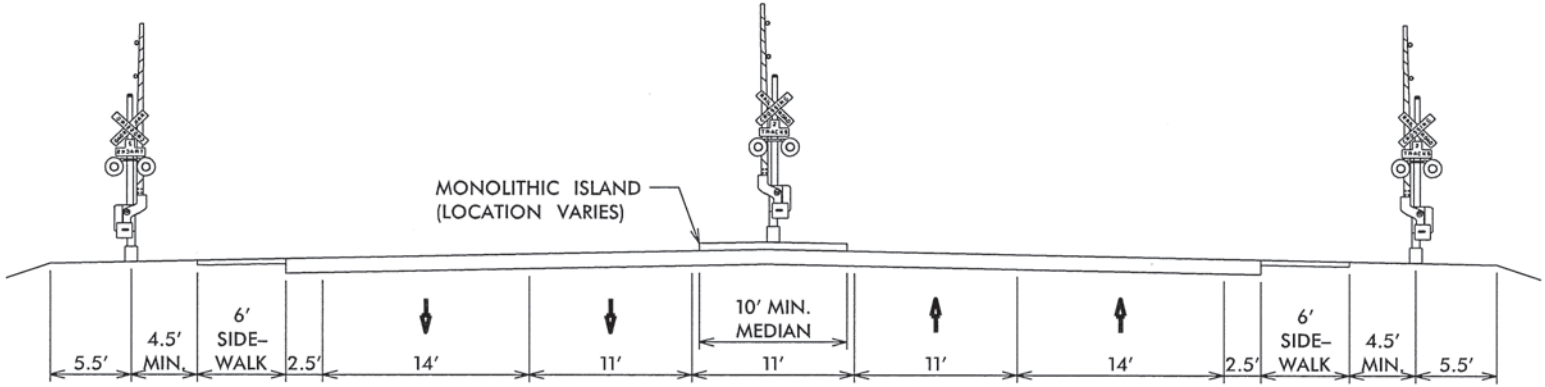
09/01/2011

SHEET 23 OF 26

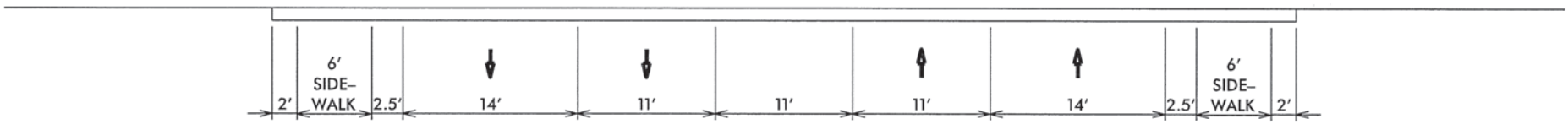
5 LANE WITH CENTER TURN LANE
CURB AND GUTTER WITH WIDE OUTSIDE LANE
AND TAPERED SIDEWALK



SECTION A–A



SECTION B–B

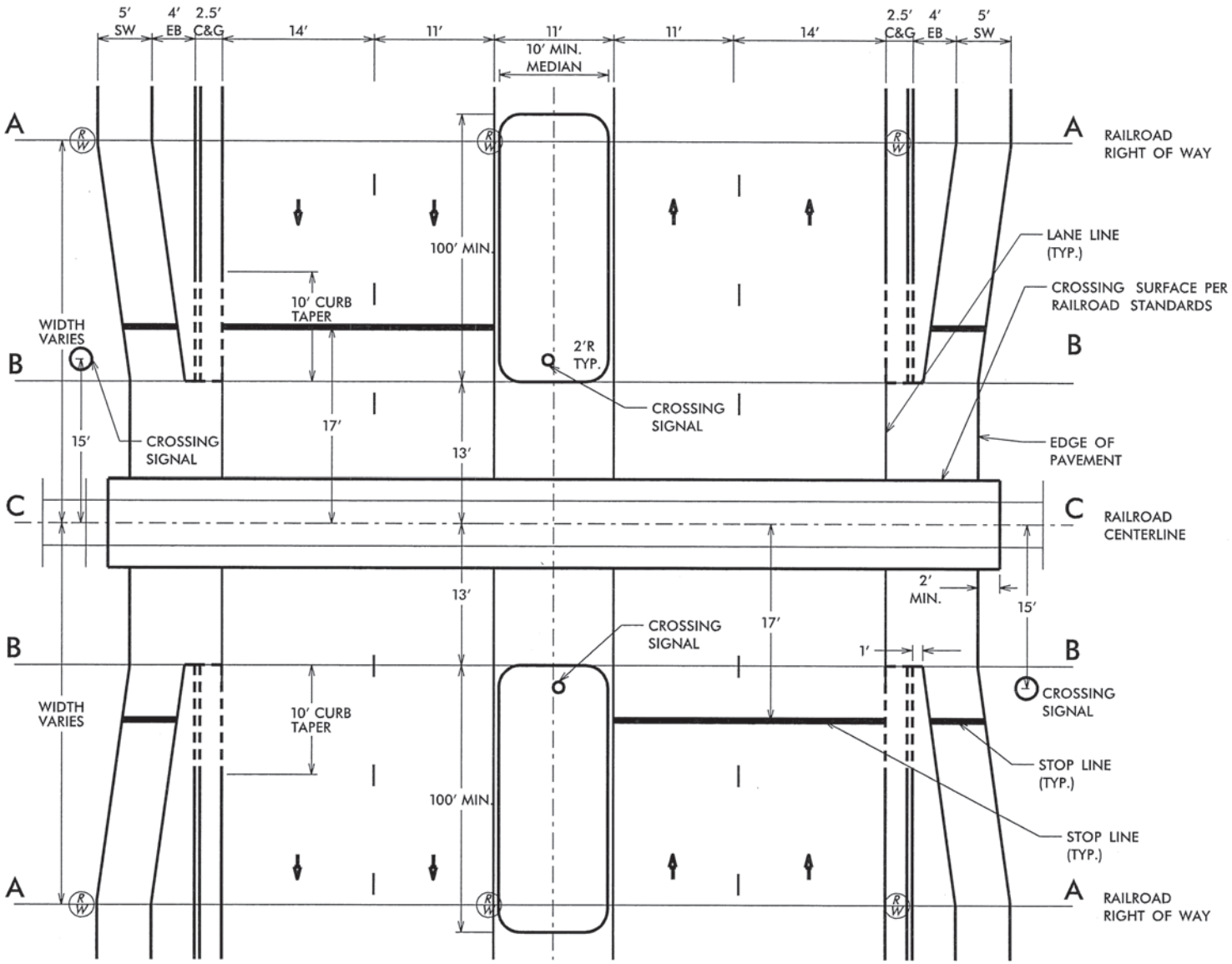


SECTION C–C

09/01/2011

SHEET 24 OF 26

5 LANE WITH CENTER TURN LANE
CURB AND GUTTER WITH WIDE OUTSIDE LANE
AND TAPERED SIDEWALK

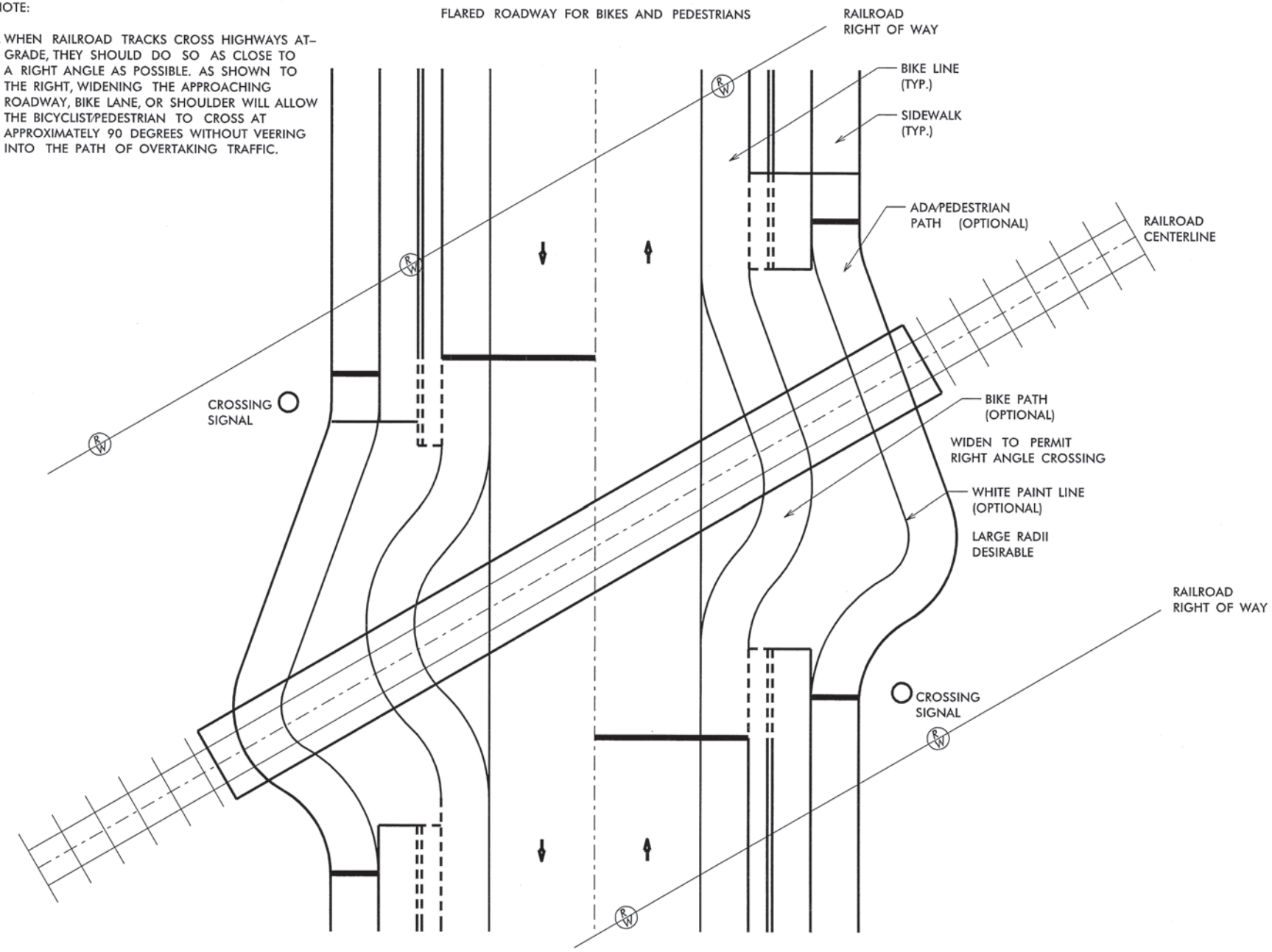


09/01/2011

SHEET 25 OF 26

NOTE:

1. WHEN RAILROAD TRACKS CROSS HIGHWAYS AT-GRADE, THEY SHOULD DO SO AS CLOSE TO A RIGHT ANGLE AS POSSIBLE. AS SHOWN TO THE RIGHT, WIDENING THE APPROACHING ROADWAY, BIKE LANE, OR SHOULDER WILL ALLOW THE BICYCLIST/PEDESTRIAN TO CROSS AT APPROXIMATELY 90 DEGREES WITHOUT VEERING INTO THE PATH OF OVERTAKING TRAFFIC.



09/01/2011

SHEET 26 OF 26

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Appendix C Maintenance and Operations Examples

Complete Streets Implemented in Maintenance Projects

The following pages illustrate examples of North Carolina projects that successfully applied complete streets strategies as part of maintenance projects.

BEFORE

AFTER

Road Diet with Bicycle Lanes and Adjacent Parking

Project Location: Mint Street, Charlotte

Project Type: Resurfacing with utility relocation and sidewalk

Description: Consistent 4-lane undivided cross-section between West Boulevard and Penman Street was converted to two 11-foot travel lanes along with 5-foot bicycle lanes and 7-foot parking bays on one side only.

Mid-block Crossing on Third Street

Rectangular Rapid Flash Beacon

Example of Use of New Technology

Project Location: Third Street/Ann Street, Wilmington

Project Type: Pedestrian Crossing Applying New Technology

Description: This project provides a marked crosswalk for pedestrians and bicyclists to cross South 3rd Street at Ann Street, which is midway between the traffic signals at Castle Street and Market Street. The project includes the installation of a Rectangular Rapid Flash Beacon, which is the first in the state to be installed. This beacon has been used in other locations throughout the country including St. Petersburg, Florida and Boulder, Colorado. The funding for this project was a joint effort between the City of Wilmington and the residents of Old Wilmington.

Note: any new and/or experimental traffic control devices need to be approved in coordination with NCDOT and the NCDOT Regional Traffic Engineer.

Reduced Shoulder Width

Shared Use Path Crossing Sidewalks to Connect Bike Routes

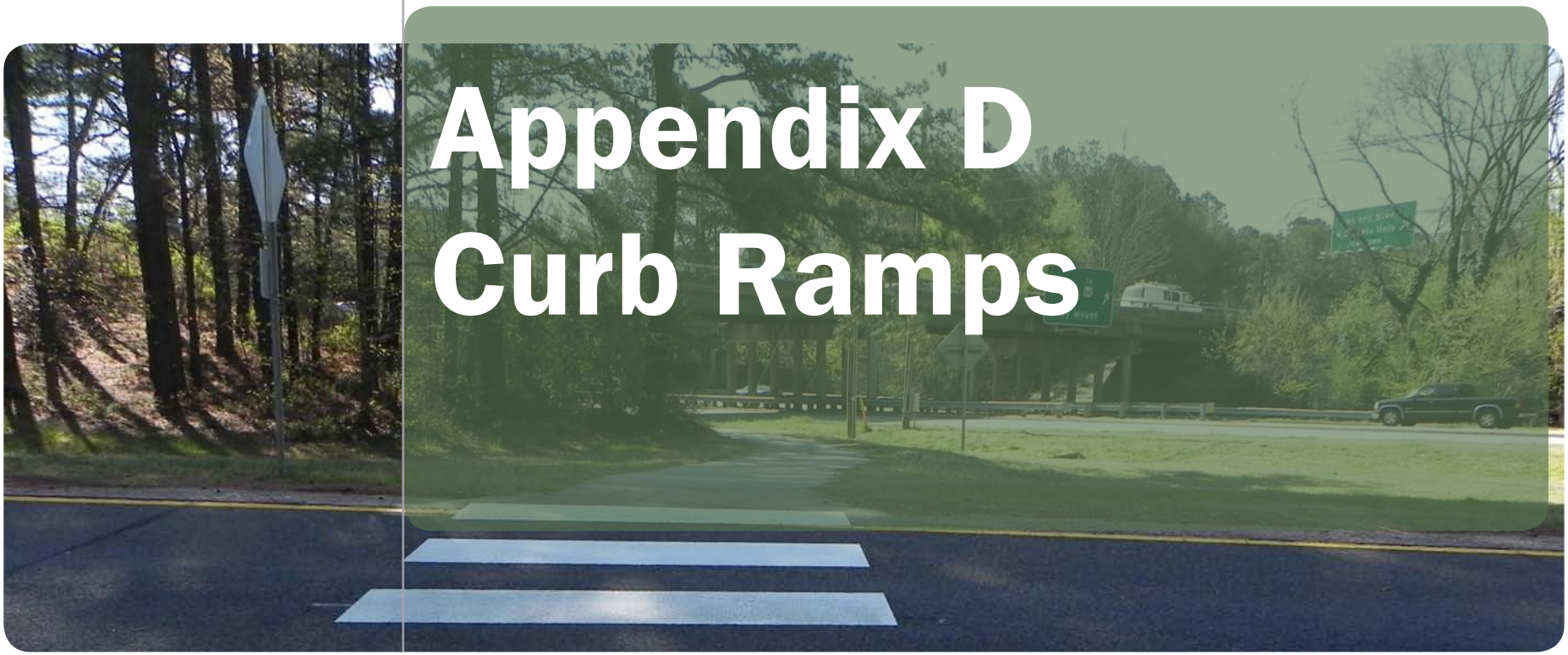
Example of Exceptions Implemented due to Roadway Restrictions

Project Location: Morganton – two examples

Project Type: Examples of complete streets applications with reduced ROW

Description: In some areas topography would require additional right of way, grading, and significant cost to provide an improvement. In the left example, an edge stripe is used with a reduced shoulder width.

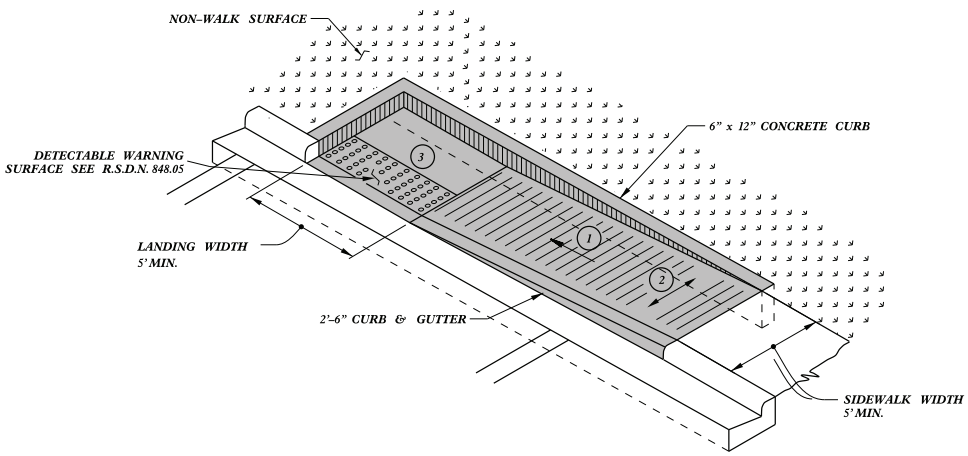
In the right example, there was desire to connect two bicycle routes. Due to topography, however, it was not possible to provide wider roadways with bike allowances. A compromise was used to widen the sidewalk on one side to provide a shared use path with the understanding that the shared use path had driveway crossings.



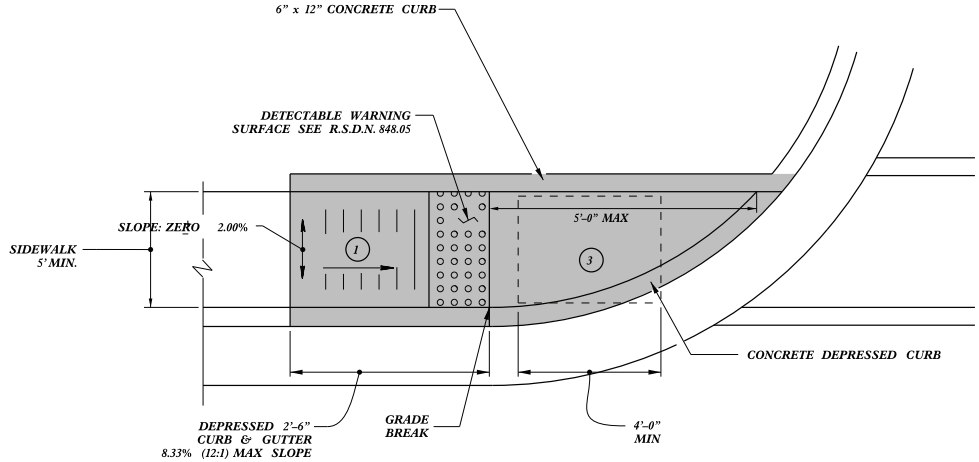
Appendix D
Curb Ramps

PROJECT REFERENCE NO.	SHEET NO.

PAY LIMITS FOR CURB RAMP



TYPE 1A



TYPE 1

1. 8.33% (12:1) MAX RAMP SLOPE
2. CROSS SLOPE: 2.00%
3. CURB RAMPS REQUIRE A (4'-0") MINIMUM LANDING WITH A MAXIMUM CROSS SLOPE AND LONGITUDINAL SLOPE OF 2.00% WHERE PEDESTRIANS PERFORM TURNING MANEUVERS. SLOPE TO DRAIN TO CURB.

REFER TO ROADWAY STANDARD DRAWING NUMBER 848.05 SHEET 3 OF 3 FOR ALL RAMP NOTES

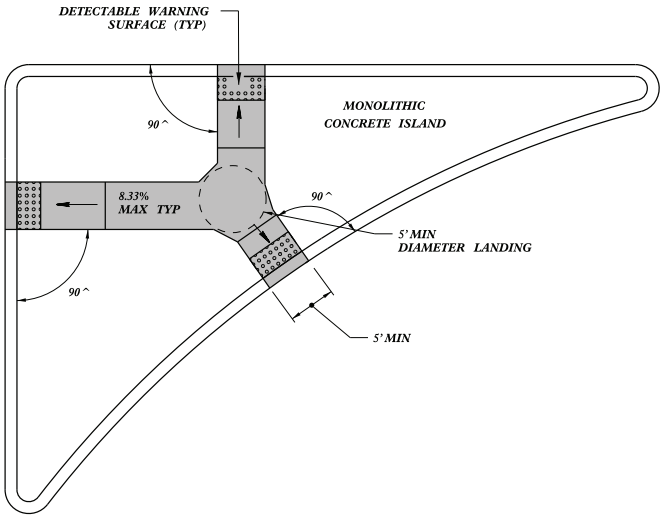
CONTRACT STANDARDS AND DEVELOPMENT UNIT
Office 919-707-6950 FAX 919-250-4119

CURB RAMPS

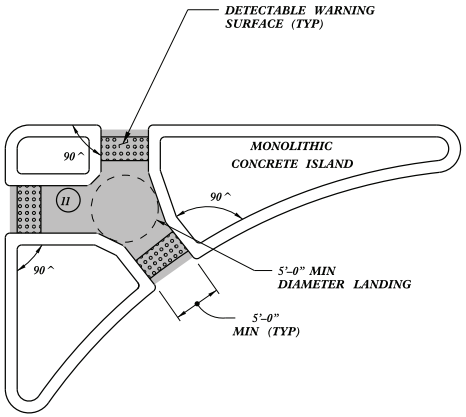
Directional Ramps

ORIGINAL BY: J.S. HOWERTON DATE: 7/7/11
MODIFIED BY: DATE:
CHECKED BY: DATE:
FILE SPEC.: stds/2012CurbRamp/CurbRampDetails.dgn

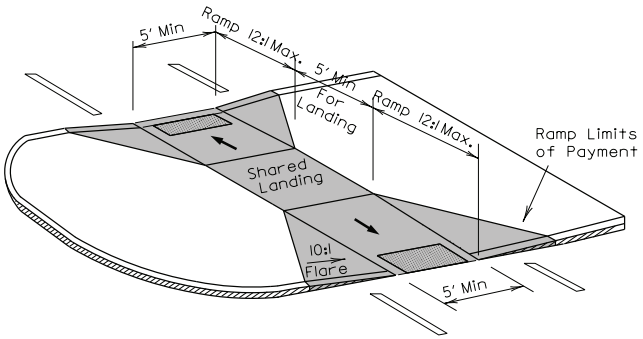
PROJECT REFERENCE NO.	SHEET NO.



LARGE ISLAND CURB RAMPS



SMALL ISLAND WITH CUT THROUGH



MEDIAN ISLAND CURB RAMPS

–SEE ROADWAY DETAIL DRAWING 848D05 FOR DETECTABLE WARNING SURFACE AND FOR RAMP NOTES.

–SEE ROADWAY STANDARD DRAWING 852.01 FOR CONCRETE ISLAND DIMENSIONS.

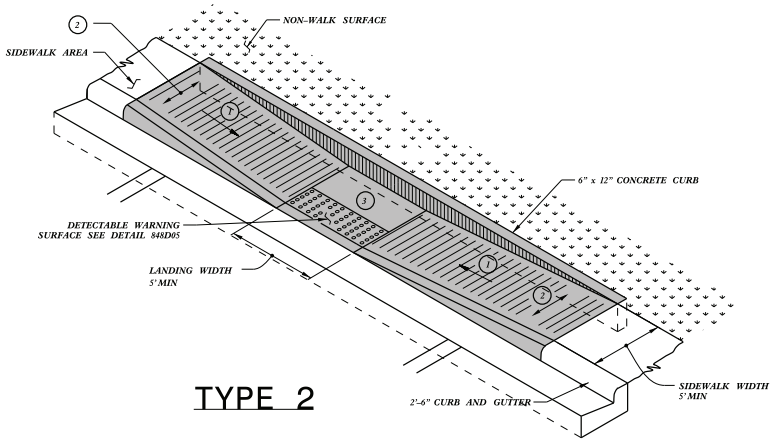
CONTRACT STANDARDS AND DEVELOPMENT UNIT
Office 919-707-6950 FAX 919-250-4119

CURB RAMPS

Median or Turn Lane Islands

ORIGINAL BY: J.S. HOWERTON DATE: 7/7/11
MODIFIED BY: DATE:
CHECKED BY: DATE:
FILE SPEC.: stds/2012CurbRamp/CurbRampDetails.dgn

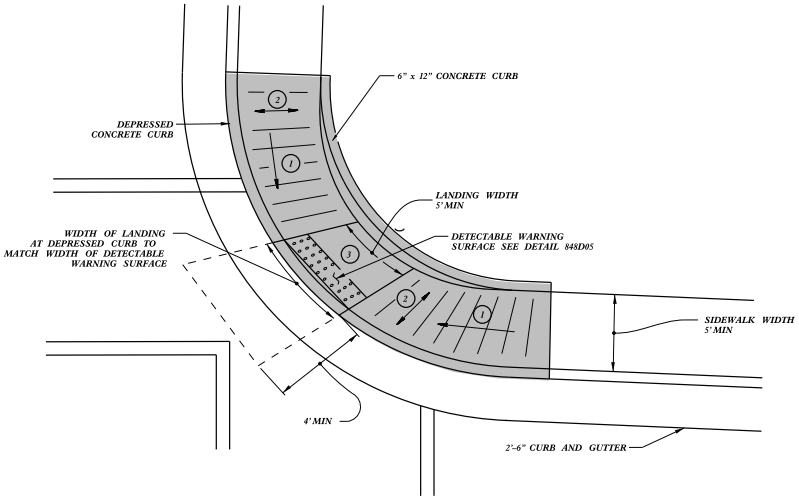
PROJECT REFERENCE NO.	SHEET NO.



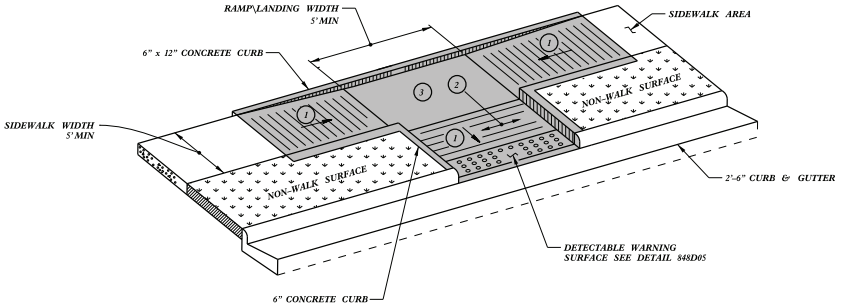
TYPE 2

PAY LIMITS FOR CURB RAMP

1. *8.33% (12:1) MAX RAMP SLOPE*
2. *CROSS SLOPE: 2.00%*
3. *CURB RAMPS REQUIRE A (4'-0") MINIMUM LANDING WITH A MAXIMUM CROSS SLOPE AND LONGITUDINAL SLOPE OF 2.00% WHERE PEDESTRIANS PERFORM TURNING MANEUVERS. SLOPE TO DRAIN TO CURB.*



TYPE 2A



TYPE 3

REFER TO ROADWAY STANDARD DRAWING NUMBER 848.05 SHEET 3 OF 3 FOR ALL RAMP NOTES

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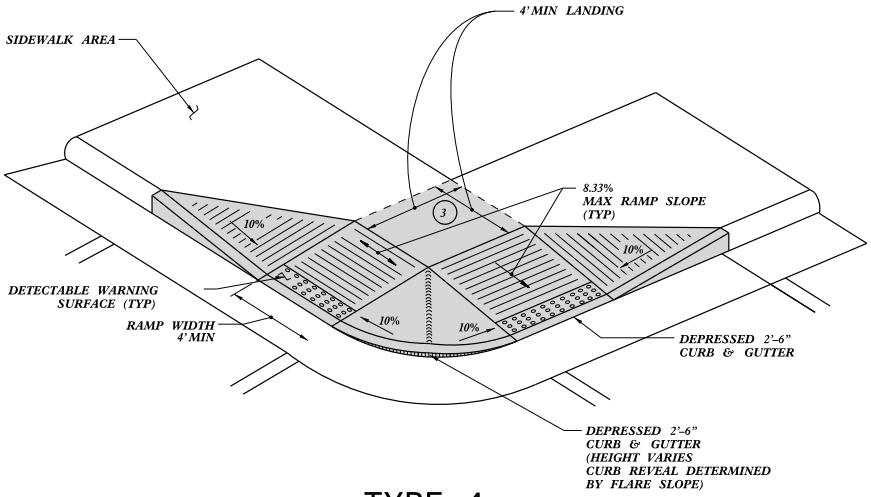
CURB RAMPS

Parallel Ramps

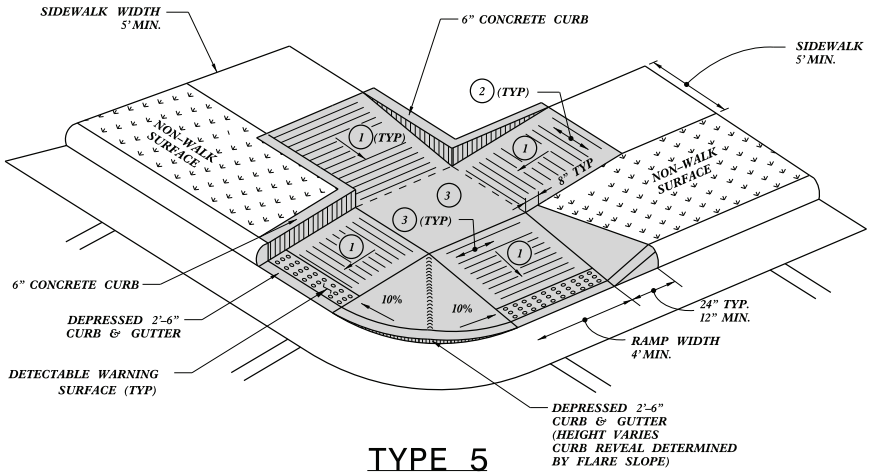
ORIGINAL BY: J.S. HOWERTON DATE: 7/7/11
MODIFIED BY: DATE:
CHECKED BY: DATE:
FILE SPEC.: stds/2012CurbRamp/CurbRampDetails.dgn

PROJECT REFERENCE NO.	SHEET NO.

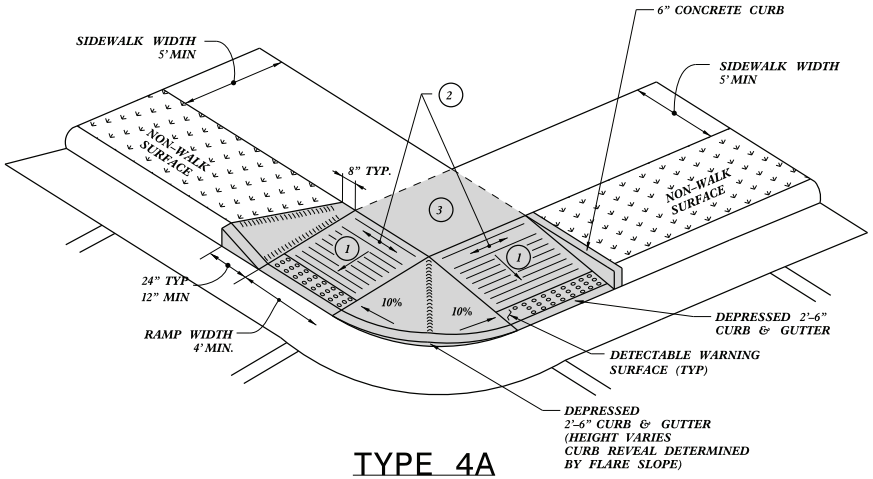


TYPE 4

PAY LIMITS FOR CURB RAMP



TYPE 5



TYPE 4A

1. 8.33% (12:1) MAX RAMP SLOPE
2. CROSS SLOPE: 2.00%
3. CURB RAMPS REQUIRE A (4'-0") MINIMUM LANDING WITH A MAXIMUM CROSS SLOPE AND LONGITUDINAL SLOPE OF 2.00% WHERE PEDESTRIANS PERFORM TURNING MANEUVERS. SLOPE TO DRAIN TO CURB.

REFER TO ROADWAY STANDARD DRAWING NUMBER 848.05 SHEET 3 OF 3 FOR ALL RAMP NOTES

CONTRACT STANDARDS AND DEVELOPMENT UNIT
Office 919-707-6950 FAX 919-250-4119

CURB RAMPS

Shared Landing

ORIGINAL BY: J.S. HOWERTON DATE: 7/7/11
MODIFIED BY: DATE:
CHECKED BY: DATE:
FILE SPEC.: stds/2012CurbRamp/CurbRampDetails.dgn

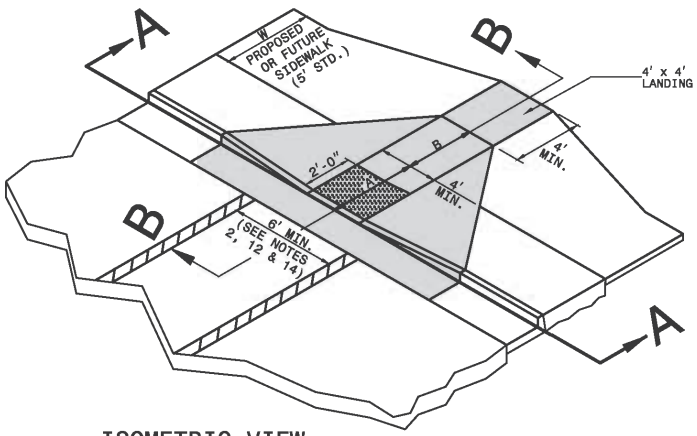
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

1-12

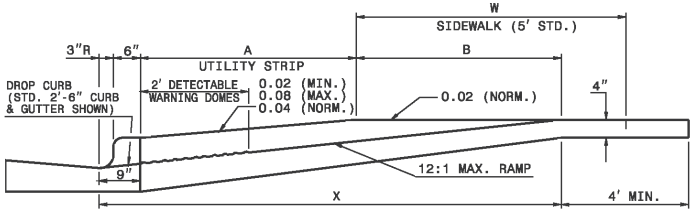
ENGLISH STANDARD DRAWING FOR

CURB RAMP

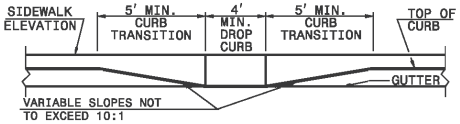
PROPOSED CURB AND GUTTER



ISOMETRIC VIEW



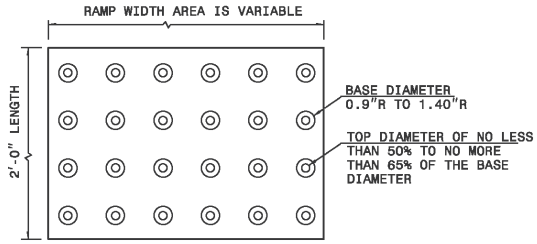
SECTION B-B

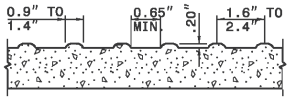


SECTION A-A

PAY LIMITS FOR CURB RAMP

NOTES:
1. DETECTABLE WARNING DOMES WILL COVER 2'-0" LENGTH AND FULL WIDTH OF THE RAMP FLOOR AS SHOWN ON THE DETAILS.
2. DETECTABLE WARNING DOMES WILL CONTRAST VISIBILITY WITH ADJOINING SURFACE, EITHER LIGHT-ON-DARK, OR DARK-ON-LIGHT SEQUENCE COVERING THE ENTIRE RAMP.

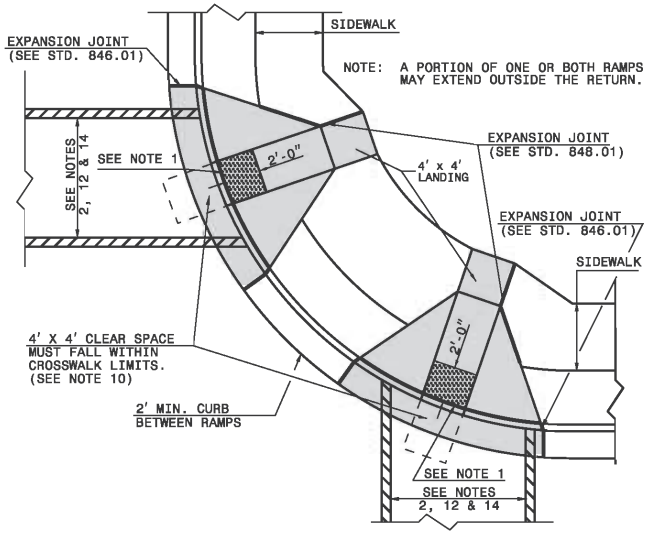




DETECTABLE WARNING DOMES

W	A	W+A+9"	X	B
5'	0.0'	5.8'	5.8'	5.0'*
6'	0.0'	6.8'	6.8'	6.0'**
7'	0.0'	7.8'	7.3'	6.5'**
8'	0.0'	8.8'	7.3'	6.5'**
5'	2.0'	7.8'	7.8'	5.0'
5'	2.5'	8.3'	8.1'	4.8'
5'	3.0'	8.8'	8.3'	4.4'
5'	3.5'	9.3'	8.4'	4.1'
5'	4.0'	9.8'	8.6'	3.8'
5'	4.5'	10.3'	8.7'	3.4'
5'	5.0'	10.8'	8.9'	3.1'

B = X-(A+9")
B = DISTANCE FROM FRONT EDGE OF SIDEWALK TO BACK POINT OF 12:1 (8.33%) SLOPE.
* BACK OF SIDEWALK DROP REQUIRED FOR ALL SIDEWALK SLOPES.
** BACK OF SIDEWALK DROP REQUIRED FOR SIDEWALK SLOPES 0.04.



PLAN VIEW

DUAL RAMPS
ANY RADII
(4' MIN. FLOOR WIDTH)

SHEET 1 OF 3

848.05

STATE OF NORTH CAROLINA
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DIVISION OF HIGHWAYS
RALEIGH, N.C.

1-12

ENGLISH STANDARD DRAWING FOR

CURB RAMP

PROPOSED CURB AND GUTTER

SHEET 1 OF 3

848.05

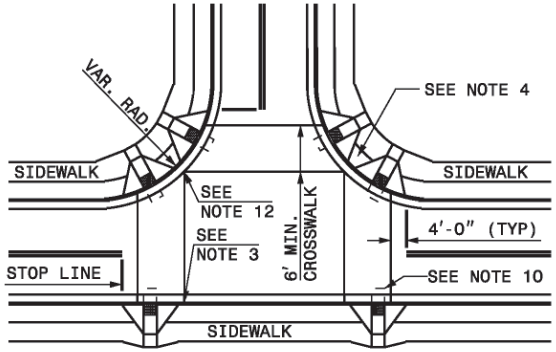
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

1-12

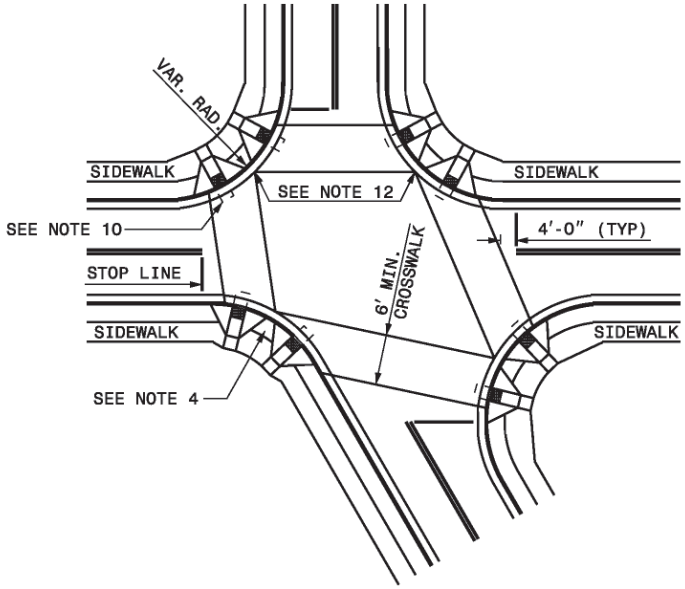
ENGLISH STANDARD DRAWING FOR

CURB RAMP

PROPOSED CURB AND GUTTER



DETAIL SHOWING TYPICAL LOCATION OF CURB RAMPS, PEDESTRIAN CROSSWALKS AND STOP LINES FOR TEE INTERSECTIONS



DETAIL SHOWING TYPICAL LOCATION OF CURB RAMPS, PEDESTRIAN CROSSWALKS AND STOP LINES

ROADWAY PLAN SYMBOL
CR
FOR PROPOSED CURB RAMP

PROPOSED CURB RAMP W/ LANDING
PROPOSED OR FUTURE SIDEWALK

ALLOWABLE LOCATIONS

DUAL RAMP RADII.....ANY

SHEET 2 OF 3
848.05

1-12
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH STANDARD DRAWING FOR

CURB RAMP

PROPOSED CURB AND GUTTER

SHEET 2 OF 3
848.05

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

1-12

ENGLISH STANDARD DRAWING FOR

CURB RAMPS

NOTES

SHEET 3 OF 3

848.05

NOTES:

1. CONSTRUCT THE RAMP SURFACE TO BE STABLE, FIRM, AND SLIP RESISTANT. CONSTRUCT THE CURB RAMP TYPE AS SHOWN IN THE PAVEMENT MARKING PLANS OR AS DIRECTED BY THE ENGINEER.
2. LOCATE CURB RAMPS AND PLACE PEDESTRIAN CROSSWALK MARKINGS AS SHOWN IN THE PAVEMENT MARKING PLANS. WHEN FIELD ADJUSTMENTS REQUIRE MOVING CURB RAMPS OR MARKINGS AS SHOWN, CONTACT THE SIGNING AND DELINEATION UNIT OR LOCATE AS DIRECTED BY THE ENGINEER.
3. COORDINATE THE CURB RAMP AND THE PEDESTRIAN CROSSWALK MARKINGS SO A 4′x4′ CLEAR SPACE AT THE BASE OF THE CURB RAMP WILL FALL WITHIN THE PEDESTRIAN CROSSWALK LINES.
4. SET BACK DISTANCE FROM INSIDE CROSSWALK MARKING TO NEAREST EDGE OF TRAVEL LANE IS 4′ MINIMUM.
5. REFER TO THE PAVEMENT MARKING PLANS FOR STOP BAR LOCATIONS AT SIGNALIZED INTERSECTIONS. IF A PAVEMENT MARKING PLAN IS NOT PROVIDED, CONTACT THE SIGNAL DESIGN SECTION FOR THE STOP BAR LOCATIONS OR LOCATE AS DIRECTED BY THE ENGINEER.
6. TERMINATE PARKING A MINIMUM OF 20′ BACK OF A PEDESTRIAN CROSSWALK.
7. CONSTRUCT CURB RAMPS A MINIMUM OF 4′ WIDE.
8. CONSTRUCT THE RUNNING SLOPE OF THE RAMP 8.33% MAXIMUM.
9. ALLOWABLE CROSS SLOPE ON SIDEWALKS AND CURB RAMPS WILL BE 2% MAXIMUM.
10. CONSTRUCT THE SIDE FLARE SLOPE A MAXIMUM OF 10% MEASURED ALONG THE CURB LINE.
11. CONSTRUCT THE COUNTER SLOPE OF THE GUTTER OR STREET AT THE BASE OF THE CURB RAMP A MAXIMUM OF 5% AND MAINTAIN A SMOOTH TRANSITION.
12. CONSTRUCT LANDINGS FOR SIDEWALK A MINIMUM OF 4′x4′ WITH A MAXIMUM SLOPE OF 2% IN ANY DIRECTION. CONSTRUCT LANDINGS FOR MEDIAN ISLANDS A MINIMUM OF 5′x5′ WITH A MAXIMUM SLOPE OF 2% IN ANY DIRECTION.
13. TO USE A MEDIAN ISLAND AS A PEDESTRIAN REFUGE AREA, MEDIAN ISLANDS WILL BE A MINIMUM OF 6′ WIDE. CONSTRUCT MEDIAN ISLANDS TO PROVIDE PASSAGE OVER OR THROUGHT THE ISLAND.
14. SMALL CHANNELIZATION ISLANDS THAT CAN NOT PROVIDE A 5′X5′ LANDING AT THE TOP OF A RAMPS, WILL BE CUT THROUGH LEVEL WITH THE SURFACE STREET.
15. CURB RAMPS WITH RETURNED CURBS MAY BE USED ONLY WHERE PEDESTRIANS WOULD NOT NORMALLY WALK ACROSS THE RAMP. THE ADJACENT SURFACE IS PLANTING OR OTHER NON-WALKING SURFACE OR THE SIDE APPROACH IS SUBSTANTIALLY OBSTRUCTED.
16. PLACE A ½″ EXPANSION JOINT WHERE THE CONCRETE CURB RAMP JOINS THE CURB AS SHOWN IN ROADWAY STANDARD DRAWING 848.01
17. PLACE ALL PEDESTRIAN PUSH BUTTON ACTUATORS AND CROSSING SIGNALS AS SHOWN IN THE PLANS OR AS SHOWN IN THE MUTCD.
18. CURB RAMPS THROUGH MEDIAN ISLANDS, SINGLE RAMPS AT DUAL CROSSWALKS OR LIMITED R/W SITUATIONS, WILL BE HANDLED BY SPECIAL DETAILS. CONTACT THE CONTRACT STANDARDS AND DEVELOPMENT UNIT FOR THE DETAILS OR FOR A SPECIAL DESIGN.

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

1-12

ENGLISH STANDARD DRAWING FOR

CURB RAMPS

NOTES

SHEET 3 OF 3

848.05

STATE OF NORTH CAROLINA
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RALEIGH, N.C.

1-12

ENGLISH STANDARD DRAWING FOR

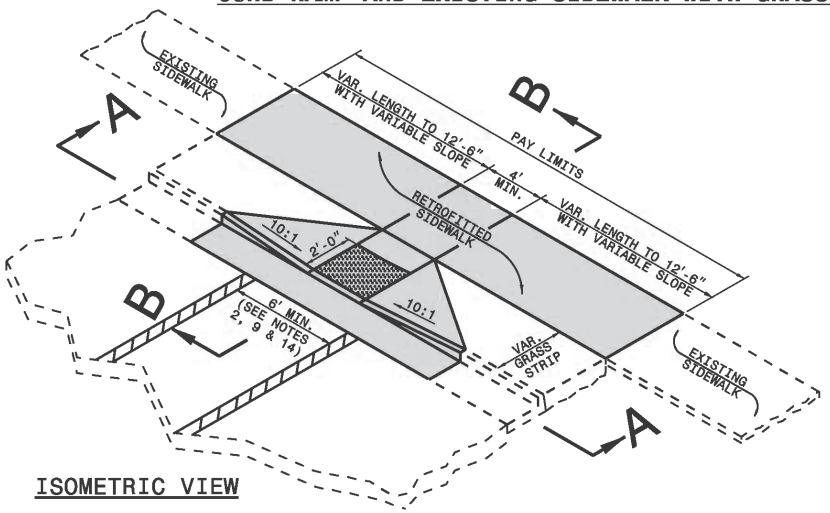
CURB RAMP

EXISTING CURB AND GUTTER

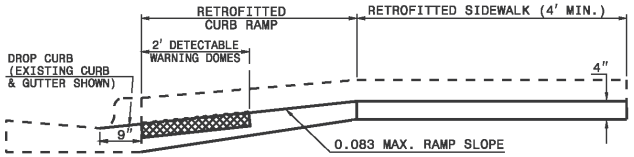
SHEET 1 OF 5

848.06

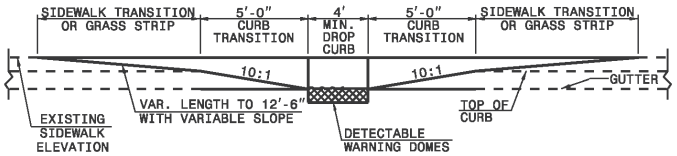
CURB RAMP AND EXISTING SIDEWALK WITH GRASS STRIP



ISOMETRIC VIEW

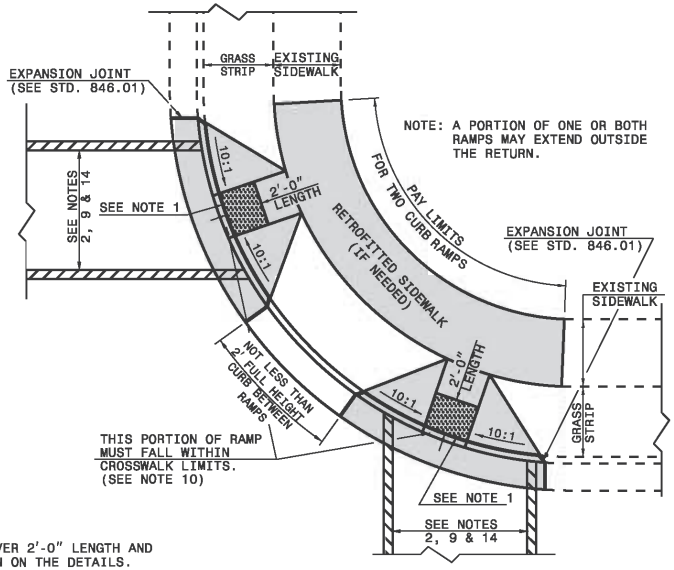


SECTION B-B



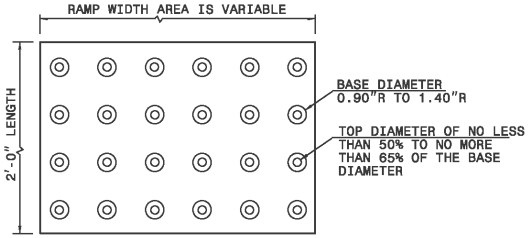
SECTION A-A

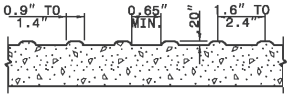
PAY LIMITS OF CURB RAMP



PLAN VIEW

DUAL RAMPS
ANY RADII
(40" MIN. FLOOR WIDTH)





DETECTABLE WARNING DOMES

NOTES:
1. PLACE DETECTABLE WARNING DOMES TO COVER 2'-0" LENGTH AND FULL WIDTH OF THE RAMP FLOOR AS SHOWN ON THE DETAILS.
2. OBTAIN VISIBLE CONTRAST WITH ADJOINING SURFACE, EITHER LIGHT-ON-DARK, OR DARK-ON-LIGHT SEQUENCE COVERING THE ENTIRE RAMP.

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ENGLISH STANDARD DRAWING FOR

CURB RAMP

EXISTING CURB AND GUTTER

SHEET 1 OF 5

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STATE OF NORTH CAROLINA
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ENGLISH STANDARD DRAWING FOR

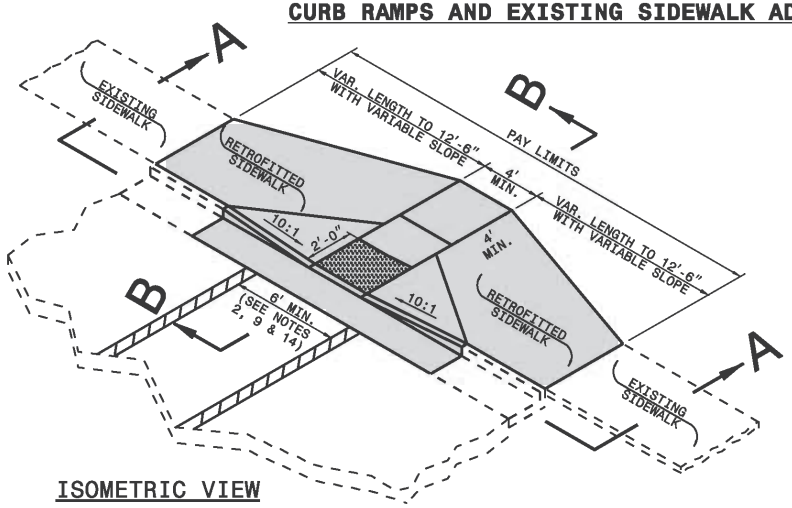
CURB RAMP

EXISTING CURB AND GUTTER

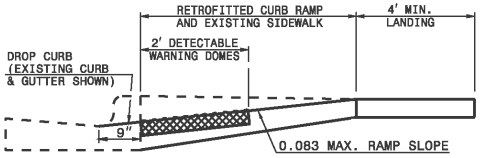
SHEET 2 OF 5

848.06

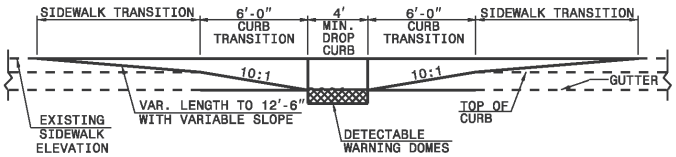
CURB RAMPS AND EXISTING SIDEWALK ADJACENT TO CURB



ISOMETRIC VIEW

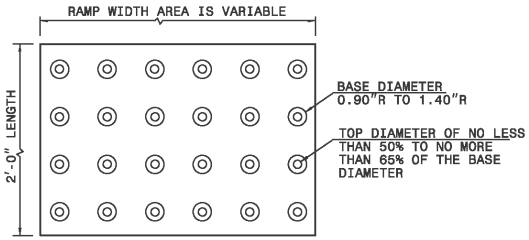


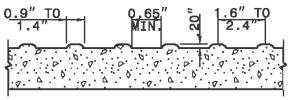
SECTION B-B



SECTION A-A

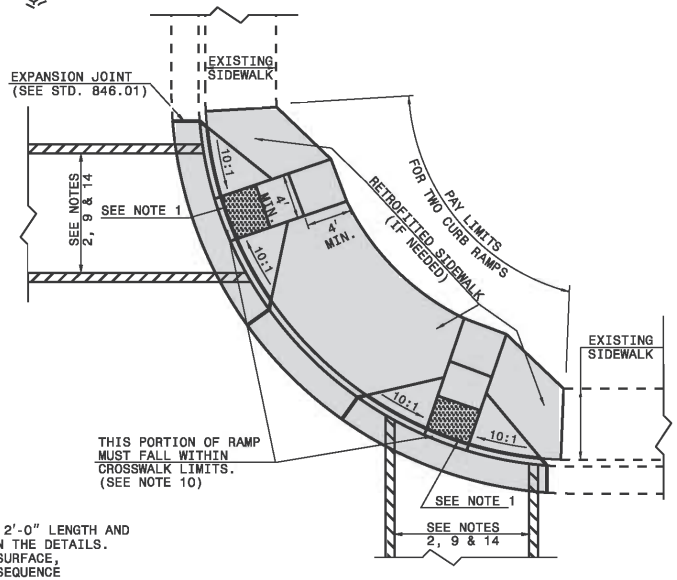
PAY LIMITS OF CURB RAMP





DETECTABLE WARNING DOMES

NOTES:
1. PLACE DETECTABLE WARNING DOMES TO COVER 2'-0" LENGTH AND FULL WIDTH OF THE RAMP FLOOR AS SHOWN ON THE DETAILS.
2. OBTAIN VISIBLE CONTRAST WITH ADJOINING SURFACE, EITHER LIGHT-ON-DARK, OR DARK-ON-LIGHT SEQUENCE COVERING THE ENTIRE RAMP.



PLAN VIEW

DUAL RAMPS
ANY RADII
(40" MIN. FLOOR WIDTH)

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

1-12

ENGLISH STANDARD DRAWING FOR

CURB RAMP

EXISTING CURB AND GUTTER

SHEET 2 OF 5

848.06

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
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ENGLISH STANDARD DRAWING FOR

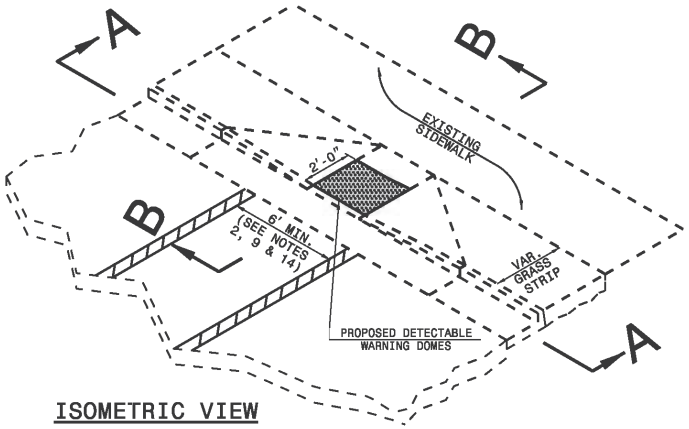
CURB RAMP

EXISTING CURB AND GUTTER

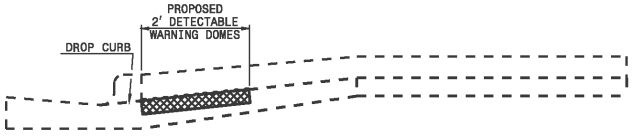
SHEET 3 OF 5

848.06

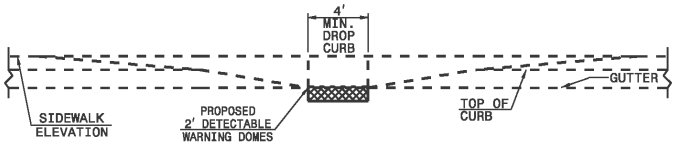
RETROFITTING DETECTABLE WARNING DOMES ONTO EXISTING CURB RAMP



ISOMETRIC VIEW

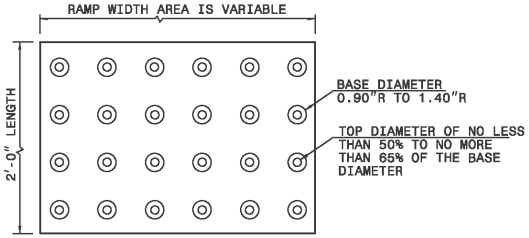


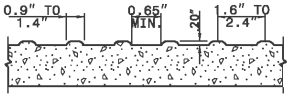
SECTION B-B



SECTION A-A

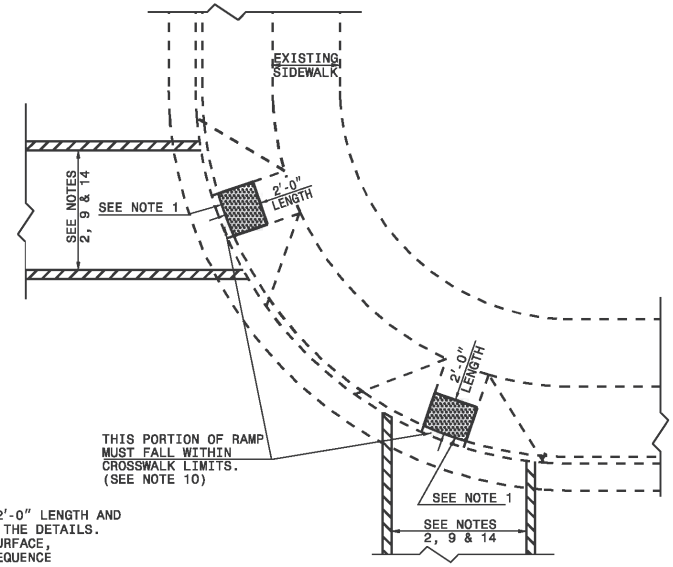
PAY LIMITS OF RETROFIT CURB RAMP





NOTES:
1. PLACE DETECTABLE WARNING DOMES TO COVER 2'-0" LENGTH AND FULL WIDTH OF THE RAMP FLOOR AS SHOWN ON THE DETAILS.
2. OBTAIN VISIBLE CONTRAST WITH ADJOINING SURFACE, EITHER LIGHT-ON-DARK, OR DARK-ON-LIGHT SEQUENCE COVERING THE ENTIRE RAMP.

DETECTABLE WARNING DOMES



PLAN VIEW

DUAL RAMPS
ANY RADII
(40" MIN. FLOOR WIDTH)

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
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RALEIGH, N.C.

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ENGLISH STANDARD DRAWING FOR

CURB RAMP

EXISTING CURB AND GUTTER

SHEET 3 OF 5

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STATE OF
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ENGLISH STANDARD DRAWING FOR

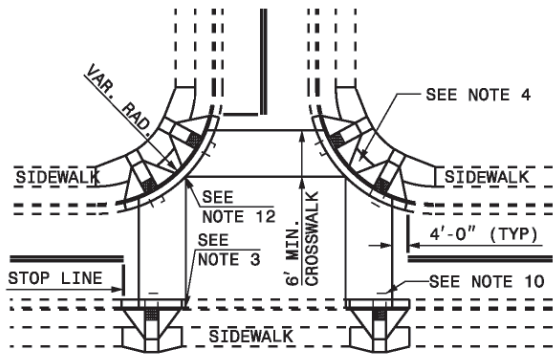
CURB RAMP

EXISTING CURB AND GUTTER

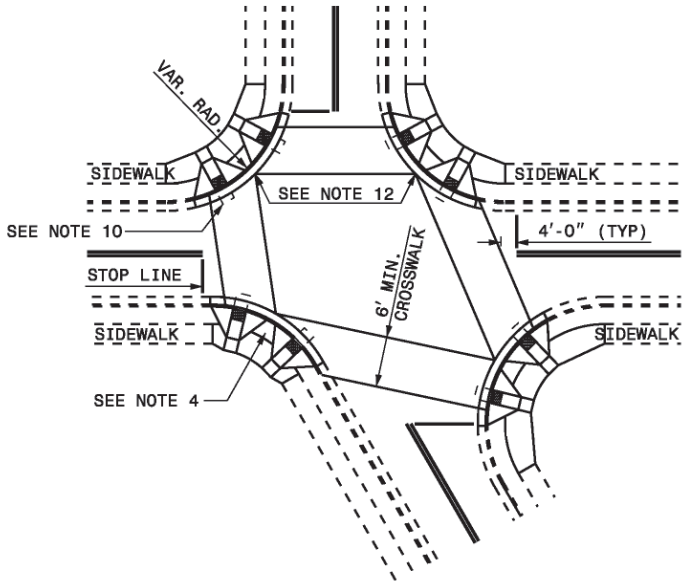
SHEET 4 OF 5

848.06

CURB RAMPS AND EXISTING SIDEWALK



DETAIL SHOWING TYPICAL LOCATION OF CURB RAMPS, PEDESTRIAN CROSSWALKS AND STOP LINES FOR TEE INTERSECTIONS



DETAIL SHOWING TYPICAL LOCATION OF CURB RAMPS, PEDESTRIAN CROSSWALKS AND STOP LINES

RESURFACING PROJECTS

PROPOSED CURB RAMP W/ LANDING FOR RESURFACING PROJECTS

EXISTING SIDEWALK

ALLOWABLE LOCATIONS

DUAL RAMP RADII.....ANY

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ENGLISH STANDARD DRAWING FOR

CURB RAMP

EXISTING CURB AND GUTTER

SHEET 4 OF 5

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DEPT. OF TRANSPORTATION
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RALEIGH, N.C.

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ENGLISH STANDARD DRAWING FOR

CURB RAMP

EXISTING CURB AND GUTTER

SHEET 5 OF 5

848.06

CURB RAMP AND EXISTING SIDEWALK

NOTES:

1. CONSTRUCT THE RAMP SURFACE TO BE STABLE, FIRM, AND SLIP RESISTANT. CONSTRUCT THE CURB RAMP TYPE AS SHOWN IN THE PAVEMENT MARKING PLANS OR AS DIRECTED BY THE ENGINEER.
2. LOCATE CURB RAMPS AND PLACE PEDESTRIAN CROSSWALK MARKINGS AS SHOWN IN THE PAVEMENT MARKING PLANS. WHEN FIELD ADJUSTMENTS REQUIRE MOVING CURB RAMPS OR MARKINGS AS SHOWN, CONTACT THE SIGNING AND DELINEATION UNIT OR LOCATE AS DIRECTED BY THE ENGINEER.
3. COORDINATE THE CURB RAMP AND THE PEDESTRIAN CROSSWALK MARKINGS SO A 4′x4′ CLEAR SPACE AT THE BASE OF THE CURB RAMP WILL FALL WITHIN THE PEDESTRIAN CROSSWALK LINES.
4. SET BACK DISTANCE FROM INSIDE CROSSWALK MARKING TO NEAREST EDGE OF TRAVEL LANE IS 4′ MINIMUM.
5. REFER TO THE PAVEMENT MARKING PLANS FOR STOP BAR LOCATIONS AT SIGNALIZED INTERSECTIONS. IF A PAVEMENT MARKING PLAN IS NOT PROVIDED, CONTACT THE SIGNAL DESIGN SECTION FOR THE STOP BAR LOCATIONS OR LOCATE AS DIRECTED BY THE ENGINEER.
6. TERMINATE PARKING A MINIMUM OF 20′ BACK OF A PEDESTRIAN CROSSWALK.
7. CONSTRUCT CURB RAMPS A MINIMUM OF 4′ WIDE.
8. CONSTRUCT THE RUNNING SLOPE OF THE RAMP 8.33% MAXIMUM.
9. ALLOWABLE CROSS SLOPE ON SIDEWALKS AND CURB RAMPS WILL BE 2% MAXIMUM.
10. CONSTRUCT THE SIDE FLARE SLOPE A MAXIMUM OF 10% MEASURED ALONG THE CURB LINE.
11. CONSTRUCT THE COUNTER SLOPE OF THE GUTTER OR STREET AT THE BASE OF THE CURB RAMP A MAXIMUM OF 5% AND MAINTAIN A SMOOTH TRANSITION.
12. CONSTRUCT LANDINGS FOR SIDEWALK A MINIMUM OF 4′x4′ WITH A MAXIMUM SLOPE OF 2% IN ANY DIRECTION. CONSTRUCT LANDINGS FOR MEDIAN ISLANDS A MINIMUM OF 5′x5′ WITH A MAXIMUM SLOPE OF 2% IN ANY DIRECTION.
13. TO USE A MEDIAN ISLAND AS A PEDESTRIAN REFUGE AREA, MEDIAN ISLANDS WILL BE A MINIMUM OF 6′ WIDE. CONSTRUCT MEDIAN ISLANDS TO PROVIDE PASSAGE OVER OR THROUGHT THE ISLAND.
14. SMALL CHANNELIZATION ISLANDS THAT CAN NOT PROVIDE A 5′X5′ LANDING AT THE TOP OF A RAMPS, WILL BE CUT THROUGH LEVEL WITH THE SURFACE STREET.
15. CURB RAMPS WITH RETURNED CURBS MAY BE USED ONLY WHERE PEDESTRIANS WOULD NOT NORMALLY WALK ACROSS THE RAMP. THE ADJACENT SURFACE IS PLANTING OR OTHER NON-WALKING SURFACE OR THE SIDE APPROACH IS SUBSTANTIALLY OBSTRUCTED.
16. PLACE A ½″ EXPANSION JOINT WHERE THE CONCRETE CURB RAMP JOINS THE CURB AS SHOWN IN ROADWAY STANDARD DRAWING 848.01
17. PLACE ALL PEDESTRIAN PUSH BUTTON ACTUATORS AND CROSSING SIGNALS AS SHOWN IN THE PLANS OR AS SHOWN IN THE MUTCD.
18. CURB RAMPS THROUGH MEDIAN ISLANDS, SINGLE RAMPS AT DUAL CROSSWALKS OR LIMITED R/W SITUATIONS, WILL BE HANDLED BY SPECIAL DETAILS. CONTACT THE CONTRACT STANDARDS AND DEVELOPMENT UNIT FOR THE DETAILS OR FOR A SPECIAL DESIGN.

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RALEIGH, N.C.

ENGLISH STANDARD DRAWING FOR

CURB RAMP

EXISTING CURB AND GUTTER

SHEET 5 OF 5

848.06

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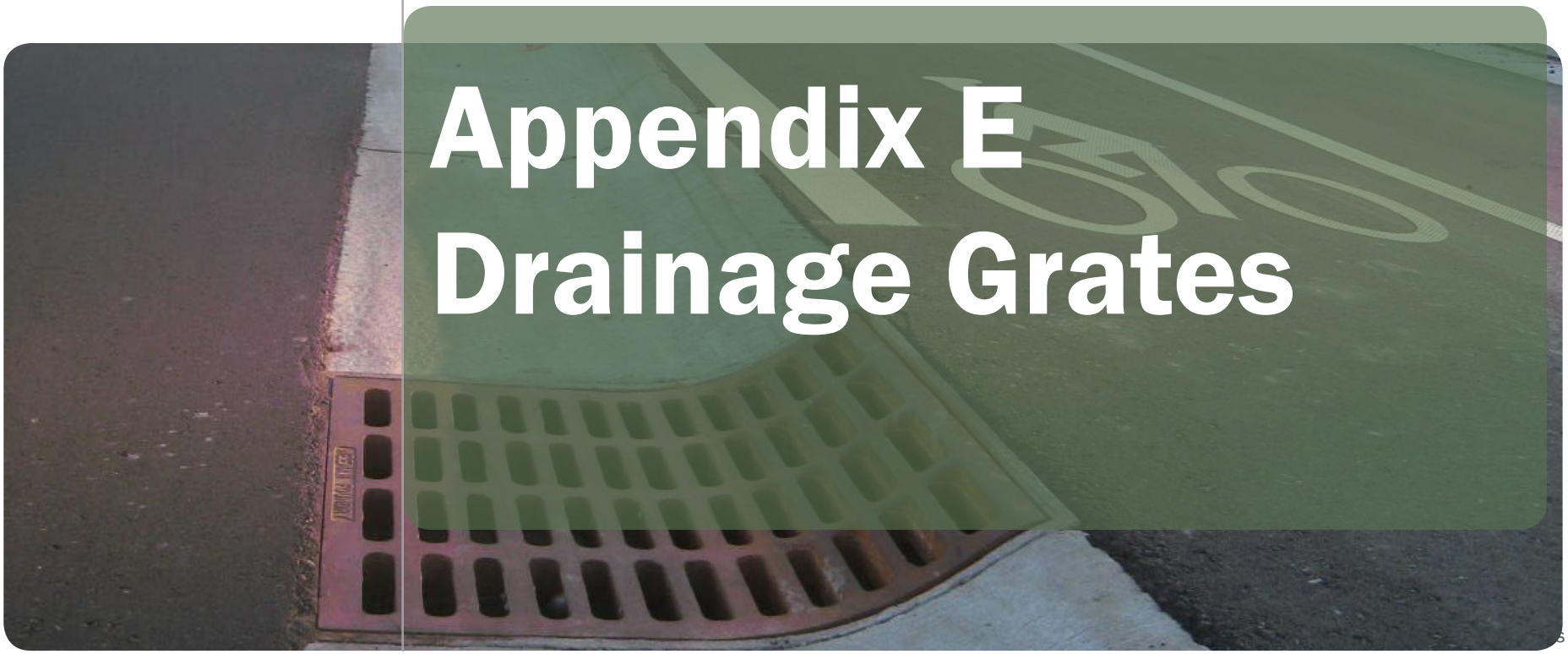


Appendix E
Drainage Grates

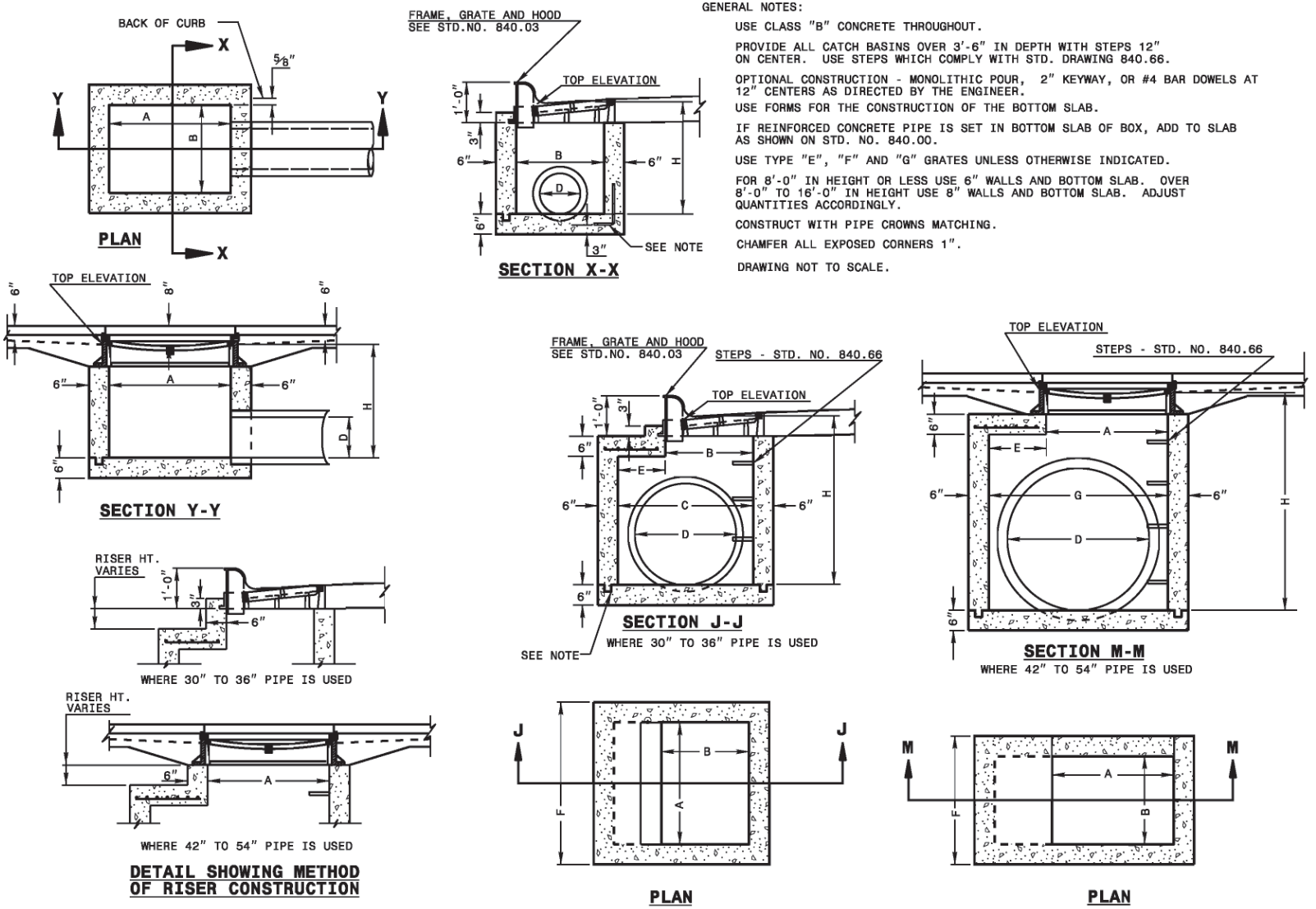
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

1-12

ENGLISH STANDARD DRAWING FOR

CONCRETE CATCH BASIN

12" THRU 54" PIPE



GENERAL NOTES:

USE CLASS "B" CONCRETE THROUGHOUT.

PROVIDE ALL CATCH BASINS OVER 3'-6" IN DEPTH WITH STEPS 12" ON CENTER. USE STEPS WHICH COMPLY WITH STD. DRAWING 840.66.

OPTIONAL CONSTRUCTION - MONOLITHIC POUR, 2" KEYWAY, OR #4 BAR DOWELS AT 12" CENTERS AS DIRECTED BY THE ENGINEER.

USE FORMS FOR THE CONSTRUCTION OF THE BOTTOM SLAB.

IF REINFORCED CONCRETE PIPE IS SET IN BOTTOM SLAB OF BOX, ADD TO SLAB AS SHOWN ON STD. NO. 840.00.

USE TYPE "E", "F" AND "G" GRATES UNLESS OTHERWISE INDICATED.

FOR 8'-0" IN HEIGHT OR LESS USE 6" WALLS AND BOTTOM SLAB. OVER 8'-0" TO 16'-0" IN HEIGHT USE 8" WALLS AND BOTTOM SLAB. ADJUST QUANTITIES ACCORDINGLY.

CONSTRUCT WITH PIPE CROWNS MATCHING.

CHAMFER ALL EXPOSED CORNERS 1".

DRAWING NOT TO SCALE.

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ENGLISH STANDARD DRAWING FOR

CONCRETE CATCH BASIN

12" THRU 54" PIPE

SHEET 1 OF 2

840.02

SHEET 1 OF 2

840.02

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NORTH CAROLINA
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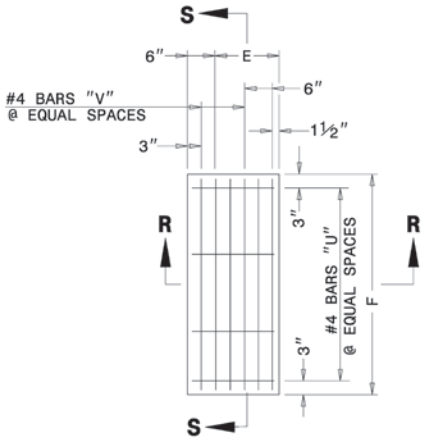
RALEIGH, N.C.

1-12

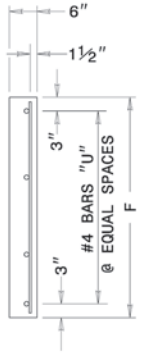
ENGLISH STANDARD DRAWING FOR
CONCRETE CATCH BASIN
12" THRU 54" PIPE

SHEET 2 OF 2

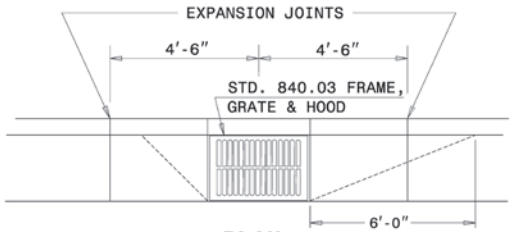
840.02



PLAN OF TOP SLAB

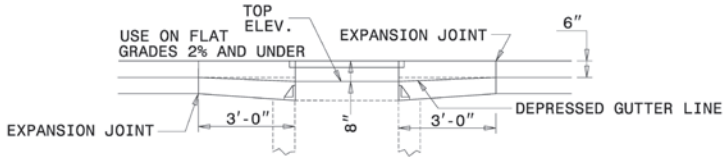


SECTION S-S



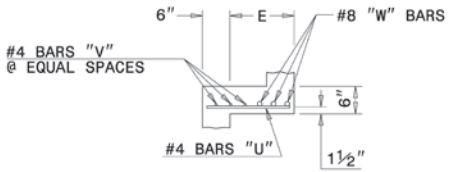
PLAN

CURB AND GUTTER WITH CATCH BASIN ON STEEP GRADES

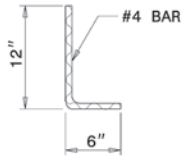


ELEVATION

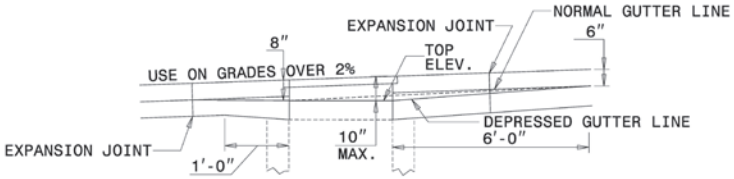
NORMAL CURB AND GUTTER ON LIGHT GRADES



SECTION R-R



DOWEL



ELEVATION

NORMAL CURB AND GUTTER ON STEEP GRADES

MINIMUM DIMENSIONS AND QUANTITIES FOR CONCRETE CATCH BASIN(BASED ON MIN. HEIGHT, H, WITH NO RISER) *

DIMENSIONS OF BOX AND PIPE						COVER DIMENSION		BARS-U		BARS-V		BARS-W			CU.YDS. CONC. IN BOX			DEDUCTIONS ONE PIPE	
PIPE	SPAN	WIDTH	WIDTH	SPAN	MIN. HEIGHT									TOTAL LBS.	TOP SLAB	BOTTOM SLAB	TOT. CONC. FOR MINIMUM HEIGHT, H		
D	A	B	C	G	H	E	F	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH					C.M.	R.C.
12"	3'-0"	2'-2"	--	--	2'-9"	--	--	--	--	--	--	--	--	--	--	0.235	0.772	0.015	0.026
15"	3'-0"	2'-2"			3'-0"											0.235	0.829	0.023	0.036
18"	3'-0"	2'-2"			3'-3"											0.235	0.887	0.033	0.049
24"	3'-0"	2'-2"			3'-9"											0.235	1.001	0.059	0.085
30"	3'-0"	2'-2"	3'-4"		4'-3"	1'-2"	4'-0"	4	1'-5"	2	3'-9"	3	3'-9"	39	0.123	0.321	1.433	0.092	0.127
36"	3'-0"	2'-2"	3'-10"		4'-9"	1'-8"	4'-0"	4	1'-11"	3	3'-9"	3	3'-9"	43	0.161	0.358	1.714	0.132	0.178
42"	3'-0"	2'-2"		4'-5"	5'-3"	1'-5"	3'-2"	4	1'-8"	2	2'-11"	3	2'-11"	32	0.112	0.318	1.738	0.180	0.243
48"	3'-0"	2'-2"		5'-0"	5'-9"	2'-0"	3'-2"	4	2'-3"	3	2'-11"	3	2'-11"	35	0.145	0.352	2.052	0.235	0.317
54"	3'-0"	2'-2"		5'-7"	6'-3"	2'-7"	3'-2"	4	2'-10"	5	2'-11"	3	2'-11"	41	0.180	0.386	2.387	0.297	0.401

* RISER HAS .228 CUBIC YARDS OF CONCRETE PER FOOT HEIGHT

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ENGLISH STANDARD DRAWING FOR
CONCRETE CATCH BASIN
12" THRU 54" PIPE

SHEET 2 OF 2

840.02

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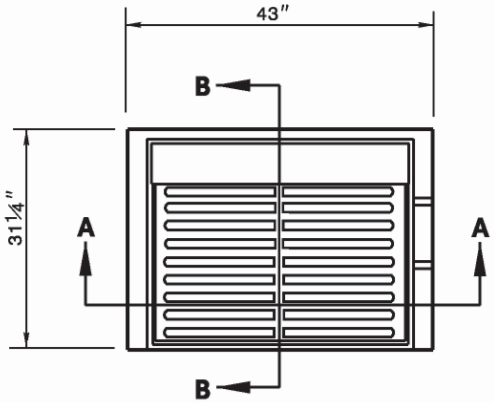
RALEIGH, N.C.

1-12

ENGLISH STANDARD DRAWING FOR
FRAME, GRATES, AND HOOD
FOR USE ON STANDARD CATCH BASIN

SHEET 1 OF 2

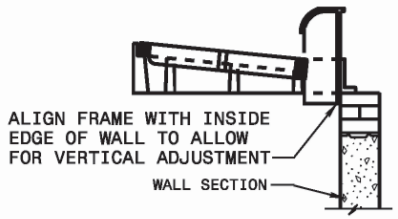
840.03



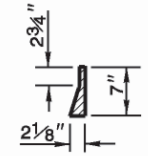
PLAN

FRAME, GRATE, & HOOD ASS'Y

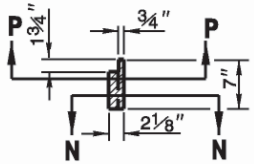
NOTE: USE TYPE "E", "F" AND "G" GRATE UNLESS OTHERWISE NOTED.



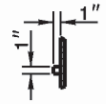
SECTION - BB



SECTION - LL



SECTION - MM



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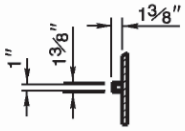
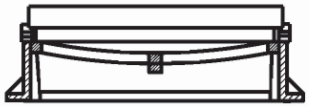
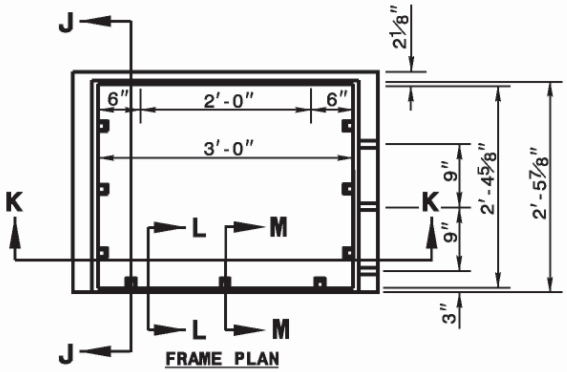


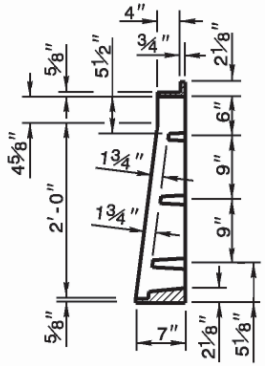
SECTION - NN



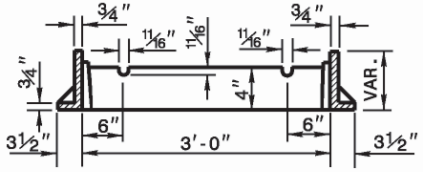
SECTION - AA



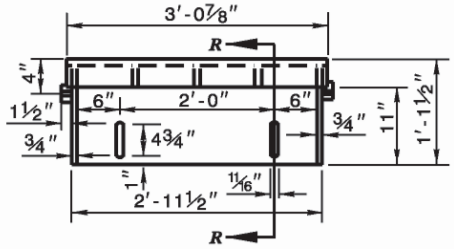
FRAME PLAN



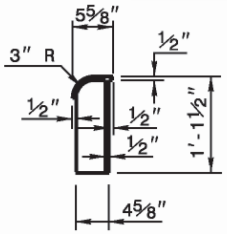
SECTION - JJ



SECTION - KK



HOOD ELEVATION



SECTION - RR

STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

1-12

ENGLISH STANDARD DRAWING FOR
FRAME, GRATES, AND HOOD
FOR USE ON STANDARD CATCH BASIN

SHEET 1 OF 2

840.03

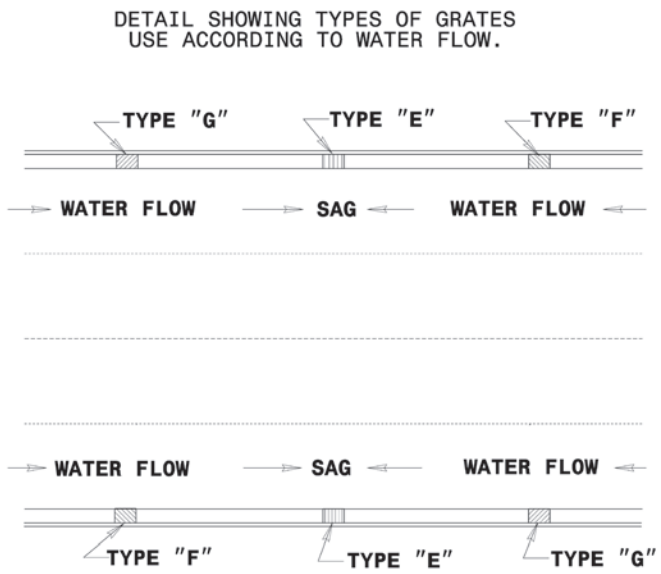
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

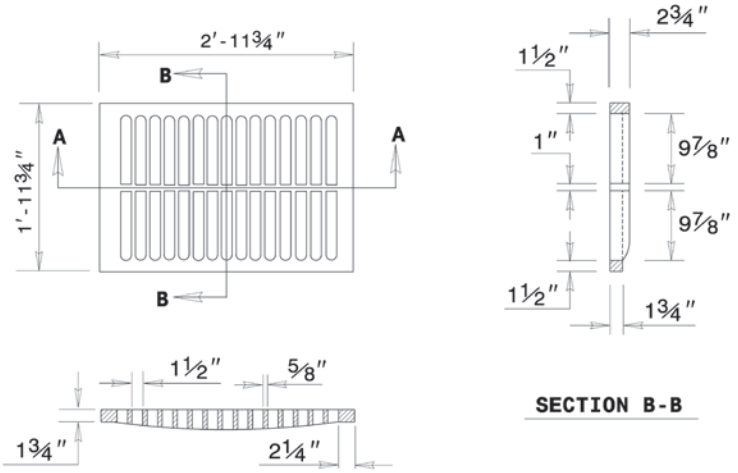
1-12

ENGLISH STANDARD DRAWING FOR
FRAME, GRATES, AND HOOD
FOR USE ON STANDARD CATCH BASIN

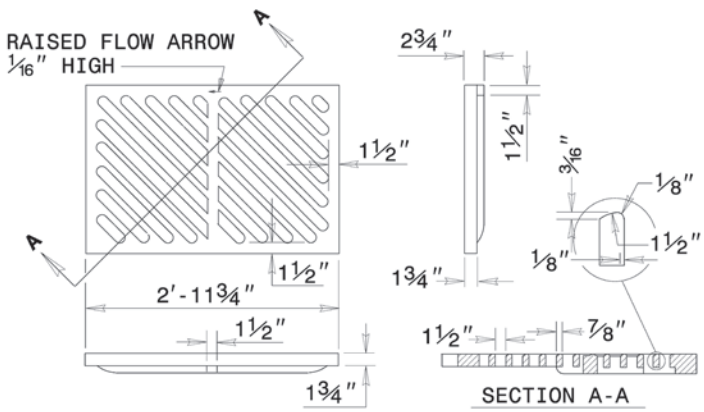
SHEET 2 OF 2

840.03

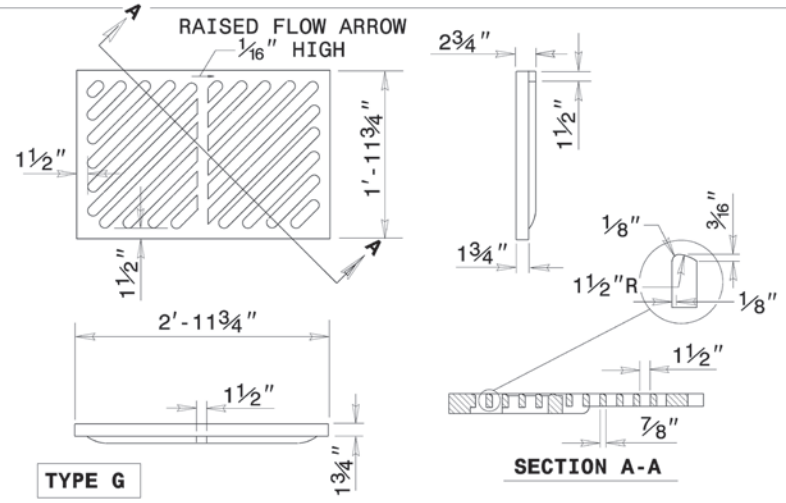




TYPE - E



TYPE - F



TYPE G

STATE OF
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RALEIGH, N.C.

1-12

ENGLISH STANDARD DRAWING FOR
FRAME, GRATES, AND HOOD
FOR USE ON STANDARD CATCH BASIN

SHEET 2 OF 2

840.03