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<td>S-3</td>
<td>COLLECTOR</td>
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<td>S-49</td>
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<tr>
<td>S-50</td>
<td>RIGHT TURN LANE DESIGN GUIDELINES (2 SHEETS)</td>
</tr>
</tbody>
</table>

**UTILITY NOTIFICATION NOTE**

**PUBLIC WORKS SIGNATURE BLOCK**
LOCAL—LOW VOLUME
SINGLE FAMILY (LARGE LOT ≥ 2.0 ACRES)
RESIDENTIAL

DESIGN PAVEMENT SECTION
COMPACTED SUBGRADE

2’ CONCRETE SHOULDER DETAIL
N.T.S.

NOTES:
1. CUT AND FILL SLOPES SHALL BE A MAXIMUM OF 4:1.
2. RIGHT-OF-WAY AND EASEMENT AREAS SHALL BE GRADED (CUT AND FILL) TO SUBGRADE (+/-0.5’) PRIOR TO AND AFTER UTILITY INSTALLATION.
3. NORMAL CROWN SLOPE IS 2%. WITH SPECIAL DESIGN REVIEW, 1% TO 5% IS ALLOWABLE AT TRANSITION AND OTHER NON-NORMAL SECTIONS.
4. OFF STREET PARKING IS REQUIRED WHEN USING THIS ROADWAY SECTION.
5. THE MAXIMUM ADT FOR THIS SECTION IS 500.
NOTES:
1. SAWCUT LONGITUDINAL CONTRACTION JOINTS SPACED AT 1/3 PAVEMENT WIDTH.
2. SAWCUT TRANSVERSE CONTRACTION JOINTS AT 10’ SPACING.
3. ALL EXPANSION AND CONTRACTION JOINTS SHALL BE SEALED.
NOTES:
1. CUT AND FILL SLOPES SHALL BE A MAXIMUM OF 4:1.
2. RIGHT-OF-WAY AND EASEMENT AREAS SHALL BE GRADED (CUT AND FILL) TO SUBGRADE (+/-0.5') PRIOR TO AND AFTER UTILITY INSTALLATION.
3. NORMAL CROWN SLOPE IS 2% WITH SPECIAL DESIGN REVIEW, 1% TO 5% IS ALLOWABLE AT TRANSITION AND OTHER NON-NORMAL SECTIONS.
4. VERTICAL FACE CURB AND GUTTER REQUIRED WHEN USING THIS STANDARD SECTION.
Local Residential - Up to 1,500 Vehicles Per Day
R.O.W. IMPROVEMENT

Local Residential - Up to 750 Vehicles Per Day
R.O.W. IMPROVEMENT

NOTES:
1. CUT AND FILL SLOPES SHALL BE A MAXIMUM OF 4:1.
2. RIGHT-OF-WAY AND EASEMENT AREAS SHALL BE GRADED (CUT AND FILL) TO SUBGRADE (+/-0.5') PRIOR TO AND AFTER UTILITY INSTALLATION.
3. NORMAL CROWN SLOPE IS 2% WITH SPECIAL DESIGN REVIEW, 1% TO 3% IS ALLOWABLE AT TRANSITION AND OTHER NON-NORMAL SECTIONS.
4. VERTICAL FACE CURB AND GUTTER IS REQUIRED ON ALL NEW LOCAL STREETS IN NEW SUBDIVISIONS.
NOTES:
1. CUT AND FILL SLOPES SHALL BE A MAXIMUM OF 4:1.
2. RIGHT-OF-WAY AND EASEMENT AREAS SHALL BE GRADED (CUT AND FILL) TO SUBGRADE (+/-0.5') PRIOR TO AND AFTER UTILITY INSTALLATION.
3. NORMAL GROWN SLOPE IS 2% WITH SPECIAL DESIGN REVIEW, 1% TO 5% IS ALLOWABLE AT TRANSITION AND OTHER NON-NORMAL SECTIONS.
THIS PAGE INTENTIONALLY LEFT BLANK.
RESERVED FOR FUTURE USE.
Minor Arterial 2-Lane With Continuous Left Turn
R.O.W. IMPROVEMENT

NOTES:
1. CUT AND FILL SLOPES SHALL BE A MAXIMUM OF 4:1.
2. RIGHT-OF-WAY AND EASEMENT AREAS SHALL BE GRADED (CUT AND FILL) TO SUBGRADE (+/-0.5') PRIOR TO AND AFTER UTILITY INSTALLATION.
3. NORMAL CROWN SLOPE IS 2%. WITH SPECIAL DESIGN REVIEW, 1% TO 5% IS ALLOWABLE AT TRANSITION AND OTHER NON-NORMAL SECTIONS.
4. ADDITIONAL RIGHT-OF-WAY WILL BE NEEDED FOR RIGHT TURN LANES WHERE WARRANTED.
DESIGN ENGINEER—
LABEL STATION OF
BEGIN TRANSITION TO
REMOVE CROWN FROM
LOCAL STREET

2% SLOPE

2% SLOPE

2% SLOPE

2% SLOPE

30’ MIN.
100’ MAX.

MINOR STREET CENTERLINE

CROSS PAN

MAJOR STREET CENTERLINE

FLOWLINE (TYP.)

CROSS PAN

CURB & GUTTER
(TYP.)

SIDEWALK
(TYP.)

P.I. ELEV
(TYP.)

NOTES:

1. DESIGN ENGINEER SHALL PROVIDE ELEVATIONS AT THESE POINTS (*) ON THE
CONSTRUCTION DRAWINGS.

2. ALL ELEVATION POINTS SHALL BE STAKED FOR CONSTRUCTION.

3. ALL FLOWLINE GRADES THAT ARE NOT PARALLEL TO CENTERLINE SHALL BE LABELED ON
INTERSECTION DETAILS OR A PROFILE DRAWING SHALL BE PROVIDED.

STREET INTERSECTION
CROSS PAN APPROACH DETAIL

DETAIL NO. S-7

DATE: JULY, 2015

SCALE: N.T.S.
NOTES:

1. DESIGN ENGINEER SHALL PROVIDE ELEVATIONS AT THESE POINTS (●) ON THE CONSTRUCTION DRAWINGS.

2. ALL ELEVATION POINTS SHALL BE STAKED FOR CONSTRUCTION.

3. ALL FLOWLINE GRADES THAT ARE NOT PARALLEL TO CENTERLINE SHALL BE LABELED ON INTERSECTION DETAILS OR A PROFILE DRAWING SHALL BE PROVIDED.
<table>
<thead>
<tr>
<th>ROADWAY CLASSIFICATION</th>
<th>RIGHT-OF-WAY MINIMUM WIDTH AT INTERSECTION</th>
<th>R.O.W. RADIUS</th>
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</thead>
<tbody>
<tr>
<td>LOCAL-COM/IND</td>
<td>60’</td>
<td>20’</td>
</tr>
<tr>
<td>LOCAL-RESID.</td>
<td>60’</td>
<td>20’</td>
</tr>
<tr>
<td>COLLECTOR WITHOUT PARKING</td>
<td>80’</td>
<td>20’</td>
</tr>
<tr>
<td>COLLECTOR WITH PARKING</td>
<td>90’</td>
<td>30’</td>
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<td>MINOR ARTERIAL (2-LANE)</td>
<td>100’</td>
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<td>120’</td>
<td>30’</td>
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<tr>
<td>MAJOR/PARKWAY ARTERIAL</td>
<td>150’</td>
<td>30’</td>
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</table>
2' WIDE CONCRETE SHOULDER

50' R.O.W.

HIGH POINT (MAY VARY)

ALPHEL WIDTH = 20'

4% MAX. 1% MIN.

50' MIN. RADIUS

34' FLOWLINE TO FLOWLINE

VERT. CURB & GUTTER

5' WIDE DETACHED SIDEWALK

GUTTER LIP

LOCAL—LOW VOLUME

60' R.O.W.

LOCAL—RESIDENTIAL

60' R.O.W.

LOCAL—COMMERCIAL/INDUSTRIAL

GUTTER LIP

VERT. CURB AND GUTTER WITH 5' (MIN.) WIDE SIDEWALK

HIGH POINT (MAY VARY)

37' FLOWLINE TO FLOWLINE

0.4% MIN.

4% MAX.

50' FL RADIUS

45' MIN. FLOWLINE

NOTES:

1. DESIGN ENGINEER SHALL PROVIDE ELEVATIONS AT THESE POINTS (●) ON THE CONSTRUCTION DRAWINGS.
2. ALL ELEVATION POINTS SHALL BE STAKED FOR CONSTRUCTION.
3. MINIMUM FLOWLINE SLOPE WITHIN CUL-DE-SAC SHALL BE 0.60%.
4. CUL-DE-SAC SHALL HAVE A MAXIMUM LENGTH OF 500' MEASURED FROM THE INTERSECTION CENTERLINE TO RADIUS POINT.
Corner Curb Ramp Detail - 20' Radius

Detail No. S-11

Date: July, 2015

Scale: N.T.S.

Notes:
1. Compacted subgrade (see specifications).
2. 8" concrete thickness applies to curb return curb and gutter and cross pan apron.
3. Construct curb ramps at all intersections.
4. ADA detectable warnings shall be installed 6" to 8" from the closest point of the flowline. See ADA detectable warning detail.
5. Extend 20:1 gutter pan slope through the curb and gutter between ramps.
6. Dimensions are based upon the use of detached sidewalk and a 90º curb return delta. Use of a different radius or a significant delta difference will alter some dimensions.
NOTES:

1. COMPACTED SUBGRADE (SEE SPECIFICATIONS).
2. 8" CONCRETE THICKNESS APPLIES TO CURB RETURN CURB AND GUTTER AND CROSS PAN APRON.
3. CONSTRUCT CURB RAMPS AT ALL INTERSECTIONS.
4. ADA DETECTABLE WARNINGS SHALL BE INSTALLED 6" TO 8" FROM THE CLOSEST POINT OF THE FLOWLINE. SEE ADA DETECTABLE WARNING DETAIL.
5. EXTEND 20:1 GUTTER PAN SLOPE THROUGH THE CURB AND GUTTER BETWEEN RAMPS.
6. DIMENSIONS ARE BASED UPON THE USE OF DETACHED SIDEWALKS AND A 90° CURB RETURN DELTA. USE OF A DIFFERENT RADIUS OR A SIGNIFICANT DELTA DIFFERENCE WILL ALTER SOME DIMENSIONS.

CORNER CURB RAMP DETAIL – 30’ RADIUS

DETAIL NO. S-12

DATE: JULY, 2015
SCALE: N.T.S.
NOTES:

SECTION A – A

1. COMPACTED SUBGRADE (SEE SPECIFICATIONS).
2. 8" CONCRETE THICKNESS APPLIES TO CURB RETURN CURB AND GUTTER AND CROSS PAN APRON.
3. CONSTRUCT CURB RAMPS AT ALL INTERSECTIONS.
4. ADA DETECTABLE WARNINGS SHALL BE INSTALLED 6" TO 8" FROM THE CLOSEST POINT OF THE FLOWLINE. SEE ADA DETECTABLE WARNING DETAIL.
5. THIS DETAIL IS INTENDED FOR USE ALONG STREETS WHEN AT "T" INTERSECTIONS OR DRIVEWAYS WITH CURB RETURNS. THE RAMP SHOULD ONLY BE USED WHERE THE MAJOR STREET PEDESTRIAN CROSSING IS NOT RECOMMENDED. THE RAMP OPENING SHALL BE LOCATED AT THE EXTENSION OF THE SIDEWALK AND BE AS WIDE AS THE SIDEWALK ALONG THE MAJOR STREET.

DIRECTIONAL CORNER CURB RAMP DETAIL

DETAIL NO. S-12-4

DATE: JULY, 2015
SCALE: N.T.S.
NOTE:
When using this ramp, the R.O.W. should be evaluated to accommodate the full depth. If applicable, additional R.O.W. or an access easement should be granted.

PLAN VIEW

SECTION A-A

SECTION B-B

NOTES:
1. Compacted subgrade (see specifications).
2. Six inch (6") concrete thickness applies to ramp, side slopes and walk area.
3. Construct a min. of one mid-block curb ramp at "T" intersections, where pedestrian crossing is desired.
4. ADA detectable warnings shall be installed 6" to 8" from flowline. See ADA Detectable Warning detail.
5. Concrete shown (except for ramps and walks) shall be poured monolithically.
6. This detail shall only be used when in association with attached sidewalks or in retrofit situations.
7. Provide a 3' gutter slope transition on each side of the bottom of the ramp opening. Reduce slope from 12:1 (10:1 on drive over) to 20:1 at ramp opening.

City of Greeley

DATE: July, 2015
SCALE: N.T.S.
NOTES:

1. COMPACTED SUBGRADE (SEE SPECIFICATIONS).
2. SIX INCH (6") CONCRETE THICKNESS APPLIES TO RAMP AREA.
3. RAMP CURB MAY BE OMITTED AT THE DIRECTION OF THE CITY.
4. ADA DETECTABLE WARNINGS SHALL BE INSTALLED 6" TO 8" FROM FLOWLINE. SEE ADA DETECTABLE WARNING DETAIL.
5. CONCRETE SHOWN (EXCEPT FOR RAMPS AND WALKS) SHALL BE POURED MONOLITHICALLY.
6. PROVIDE A 3' GUTTER SLOPE TRANSITION ON EACH SIDE OF THE BOTTOM OF THE RAMP OPENING. REDUCE SLOPE FROM 12:1 TO 20:1 AT RAMP OPENING.
7. CONSTRUCT A MIN. OF ONE MID-BLOCK CURB RAMP AT “T” INTERSECTIONS, WHERE PEDESTRIAN CROSSING IS DESIRED.
NOTES:

1. CUT AND FILL SLOPES SHALL BE A MAXIMUM OF 4:1.
2. THIS DETAIL SHALL BE USED ONLY IN THOSE SITUATIONS APPROVED BY THE CITY OR IN RETROFIT LOCATIONS. DETACHED SIDEWALKS AND VERTICAL FACE CURB AND GUTTER IS REQUIRED ON ALL NEW STREETS IN NEW RESIDENTIAL SUBDIVISIONS.
3. MAXIMUM SPACING OF CONTRACTION JOINTS – TEN (10) FEET.
4. EXPANSION JOINTS ARE REQUIRED, SEE JOINT DETAILS.
5. CONCRETE SURFACES TO RECEIVE A LIGHT BROOM FINISH.
NOTES:
1. DRIVE OVER CURB SHALL NOT BE USED ADJACENT TO TRAVEL LANE.
2. DETACHED SIDEWALK WHEN USED WITH THIS SECTION SHALL BE 6" MINIMUM THICKNESS.
3. MAXIMUM SPACING OF CONTRACTION JOINTS – TEN (10) FEET.
4. EXPANSION JOINTS ARE REQUIRED, SEE JOINT DETAILS.
5. CONCRETE SURFACES TO RECEIVE A LIGHT BROOM FINISH.
6. THIS DETAIL SHALL BE USED ONLY IN THOSE SITUATIONS APPROVED BY THE CITY OR IN RETROFIT SITUATIONS. DETACHED SIDEWALKS AND VERTICAL FACE CURB AND GUTTER IS REQUIRED ON ALL NEW STREETS IN NEW RESIDENTIAL SUBDIVISIONS.
NOTES:

1. WHEN CONSTRUCTING ATTACHED SIDEWALK, CONTRACTION JOINTS FOR SIDEWALKS SHALL MATCH CURB AND GUTTER, MAXIMUM SPACING OF TEN (10) FEET.

2. AT RESIDENTIAL DRIVEWAYS, THE SIDEWALK THICKNESS SHALL BE INCREASED TO SIX (6) INCHES.

3. EXPANSION JOINTS REQUIRED AT 400 FOOT MAXIMUM SPACING. ADDITIONAL JOINTS MAY BE REQUIRED AT THE DISCRETION OF THE ENGINEER. SEE JOINT DETAILS.

4. AT ALLEYS AND COMMERCIAL DRIVEWAYS, THE CURB AND SIDEWALK THICKNESS SHALL BE INCREASED TO EIGHT (8) INCHES.

5. CONCRETE SURFACES TO RECEIVE A LIGHT BROOM FINISH.
NOTES:

1. COLOR SHALL BE APPROVED BY THE CITY BUT IN ALL CASES THE COLOR SHALL CONTRAST WITH ADJOINING SURFACES, EITHER LIGHT-ON-DARK OR DARK-ON-LIGHT.

2. ADA DETECTABLE WARNINGS SHALL BE INSTALLED 6" TO 8" FROM FLOWLINE USING APPROVED MATERIAL.
DRIVE OVER CURB
WITH REVERSE SLOPE GUTTER

6" VERTICAL FACE CURB WITH REVERSE SLOPE GUTTER

NOTES:
1. CONTRACTION JOINTS FOR CONCRETE MEDIAN COVER SHALL MATCH CURB AND GUTTER, MAXIMUM SPACING OF TEN (10) FEET.
2. EXPANSION JOINTS REQUIRED AT 400 FOOT MAXIMUM SPACING. ADDITIONAL JOINTS MAY BE REQUIRED AT THE DISCRETION OF THE ENGINEER. SEE JOINT DETAILS.
3. CONCRETE SURFACES TO RECEIVE A LIGHT BROOM FINISH.

MEDIAN CURBS
DETAIL NO. S–18
DATE: JULY, 2015
SCALE: N.T.S.
NOTES:

1. COMPACTED SUBGRADE (SEE SPECIFICATIONS).
2. TEN FOOT (10') TEMPORARY END SECTION TO BE REMOVED TO CONTINUE CURB, GUTTER AND SIDEWALK.
3. PROVIDE A 6' GUTTER SLOPE TRANSITION AT THE TEMPORARY END SECTION. REDUCE SLOPE FROM 12:1 AT EXPANSION JOINT TO 50:1 AT FINAL 4'.
4. CONCRETE SURFACES TO RECEIVE A LIGHT BROOM FINISH.

SECTION A—A

CURB, GUTTER & SIDEWALK
TEMPORARY END SECTION
DETAIL NO. S-19

DATE: JULY, 2015
SCALE: N.T.S.
EXTRUDED CURB

NOTES:
1. ADHESIVE USED IN BONDING CURBHEAD TO SURFACE SHALL BE SPREAD ON A CLEAN SURFACE.
2. ADHESIVE SHALL BE APPROVED BY THE CITY PRIOR TO CONSTRUCTION.
3. CONSTRUCT CURBS OF CONCRETE OR ASPHALT AS APPROVED BY THE CITY.
4. CONCRETE SURFACES TO RECEIVE A LIGHT BROOM FINISH.
NOTES:

1. MAXIMUM SPACING OF CONTRACTION JOINTS IS TEN (10) FEET.

2. AT RESIDENTIAL DRIVEWAYS, THE SIDEWALK THICKNESS SHALL BE INCREASED TO SIX (6) INCHES.

3. EXPANSION JOINTS REQUIRED AT 400 FOOT MAXIMUM SPACING. ADDITIONAL JOINTS MAY BE REQUIRED AT THE DISCRETION OF THE ENGINEER. SEE JOINT DETAILS.

4. AT ALLEYS AND COMMERICAL DRIVEWAYS, THE SIDEWALK THICKNESS SHALL BE INCREASED TO EIGHT (8) INCHES.

5. CONCRETE SURFACES TO RECEIVE A LIGHT BROOM FINISH.
EXPANSION JOINT

NOTE FOR EXPANSION JOINTS:
EXPANSION JOINTS REQUIRED AT 400 FOOT MAXIMUM SPACING. ADDITIONAL JOINTS MAY BE REQUIRED AT THE DISCRETION OF THE ENGINEER.

CONTRACTION JOINT

NOTES FOR CONTRACTION JOINTS:
1. FORM WITH TOOL TEMPLATE OR SAWCUT JOINTS.
2. SAWCUT JOINTS, IF USED, SHALL BEGIN AS SOON AS CONCRETE IS HARDENED SUFFICIENTLY TO PERMIT SAWING WITHOUT EXCESSIVE RAVELING AND BEFORE UNCONTROLLED CRACKING OCCURS.
3. MAXIMUM DISTANCE BETWEEN JOINTS IS TEN (10) FEET AND MINIMUM DISTANCE IS FIVE (5) FEET.
NOTES:

1. COMPACTED SUBGRADE (SEE SPECIFICATIONS).

2. FOR DRIVE OVER CURB, GUTTER AND SIDEWALK, TRANSITION (3’ MIN.) TO A VERTICAL FACE CURB AND GUTTER FOR CHASE CONSTRUCTION. KEEP GUTTER WIDTH FOR DRIVE OVER.

3. NEENAH R-4999 SERIES BOLTED TRANSVERSE DRAINAGE STRUCTURE, SOLID CHECKERED TYPE D GRATE MAY BE SUBSTITuted.

4. CONCRETE SURFACES TO RECEIVE A LIGHT BROOM FINISH.

5. ELIMINATE 1/2” FLOWLINE LIP WHEN STORMWATER DRAINS AWAY FROM THE GUTTER.
HOT DIP GALvanized PLate

3/8" countersunk non-corrOSive machine screw (Typ.) installed along one side only

3"x4"x3/8" hot dip galvanized angle bar extending the full length of plate

<table>
<thead>
<tr>
<th>Width of Opening</th>
<th>Threadplate Thickness</th>
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<tbody>
<tr>
<td>12&quot;-18&quot;</td>
<td>9/16&quot;</td>
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<tr>
<td>&gt;18&quot;-24&quot;</td>
<td>5/8&quot;</td>
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<tr>
<td>&gt;24&quot;</td>
<td>Special Design</td>
</tr>
</tbody>
</table>

No. 3 Rebar - 10" o.c.

Detail "A"

1'-10" (Typ. both sides) Varies (12" Min.)

3" 3"

1/2" space 5 1/4" Min.

1/4"

18"-No. 4 dowel bar, either greased or sleeved 24" o.c. (Typ. both sides)

6" 6" Min. 6"

2:1 slope (Typ. both sides)

Section B-B

Notes:
1. Compacted subgrade (see specifications).
2. Neenah R-4999 Series bolted transverse drainage structure, solid checkered type D grate may be substituted.
3. Concrete surfaces to receive a light broom finish.
4. Eliminate 1/2" flowline lip when stormwater drains away from the gutter.
NOTES:

1. FRONTAGES ON CUL-DE-SACS AND ODD SHAPED LOTS NEED SPECIAL REVIEW.

2. LOCATION OF CURB CUTS ADJACENT TO MINOR ARTERIALS AND MAJOR COLLECTORS WILL BE EVALUATED ON AN INDIVIDUAL BASIS BY THE ENGINEER.

3. DRIVEWAY WIDTHS (W) SHALL BE:
   12' MINIMUM
   36' MAXIMUM

4. THERE SHALL BE A MINIMUM OF TWENTY (20) FEET CLEAR SEPARATION BETWEEN DRIVEWAYS ON A SINGLE LOT.
DRIVEWAY—
CONCRETE SHALL HAVE A 6”
MIN. THICKNESS TO THE BACK
OF THE WALK

SAWCUT LINE
(TYP.)

CONTRACTION
JOINT (TYP.)

PROPERTY LINE (RIGHT-OF-WAY)

REPAIRED CONCRETE CURB & GUTTER
SHALL HAVE A STRAIGHT LIP — ASPHALT
SHALL BE CUT STRAIGHT AND PATCHED
WITH A MINIMUM 3’ WIDE PATCH

NOTES:

1. THE FOLLOWING AREAS IN THE PUBLIC RIGHT-OF-WAY SHALL BE CONSIDERED FOR REPAIR:
   • SIDEWALK, CURB, AND/OR GUTTER ADJACENT TO ANY PUBLIC STREET.
   • DETACHED SIDEWALK ALONG ANY PUBLIC STREET.
   • SIDEWALK (CARRIAGE WALKS) BETWEEN THE DETACHED SIDEWALK AND ANY PUBLIC
     STREET.
   • DRIVEWAY APPROACHES BETWEEN THE DETACHED SIDEWALK AND ANY PUBLIC STREET.

2. FOR DRIVE OVER CURB, GUTTER & SIDEWALK, REPAIRS SHALL BE SAWCUT FROM THE BACK
   OF THE WALK TO THE LIP OF THE GUTTER AND NO LESS THAN 5’ WIDE, AS SHOWN.

3. IN DRIVEWAYS, ALL BROKEN SECTIONS (WHICH MEET THE FOLLOWING CRITERIA FOR REPAIR)
   SHALL BE REPAIRED AS SHOWN WITH A MINIMUM 6” CONCRETE DEPTH.

CRITERIA FOR REPAIR OF CURB, GUTTER, SIDEWALK & DRIVE
WAY APPROACHES IN THE PUBLIC RIGHT-OF-WAY:

A. TWO SECTIONS HAVING AN ELEVATION DIFFERENCE OF 3/4”, OR GREATER, AT ANY
   LOCATION ALONG THE TOOLED JOINT OR CRACK.

B. ANY SECTION WITH CRACKS 1/2” IN WIDTH, OR GREATER.

C. SPALLING (CRUMBLING OF CONCRETE SURFACE) OF DEPTHS GREATER THAN 3/4”, OR
   ENCOMPASSING MORE THAN 50% OF THE CONCRETE SECTION.

D. ANY PORTION OF A CONCRETE SECTION MISSING.

E. SECTIONS DISPLACED FROM ORIGINAL GRADE AT MORE THAN A 12:1 SLOPE.
NOTES:

1. CONTRACTION JOINTS ARE REQUIRED AT EACH END OF WARPED SECTION AND SHOULD BE EVENLY SPACED A MAXIMUM OF 10’ IN EITHER DIRECTION ALONG THE DRIVEWAY.
2. APPLY LIGHT BROOM FINISH TO SURFACES.
3. DRIVEWAY SECTION SHALL BE 6” THICK ON ALL RESIDENTIAL, MULTIFAMILY RESIDENTIAL, AND 8” THICK ON ALL COMMERCIAL, INDUSTRIAL AND ALLEY DRIVEWAYS.
4. DRIVEWAY WIDTHS: 12’ MIN TO 36’ MAX.
5. DRIVEWAY WIDTHS FOR COMMERCIAL/INDUSTRIAL AREAS SHALL BE APPROVED BY THE CITY.
6. SHOW DIMENSIONS AND LOCATIONS OF DRIVEWAY ON CONSTRUCTION PLANS.
7. CONSTRUCTION SHALL CONFORM TO ALL ADA STANDARDS FOR SIDEWALKS.
8. RETROFIT DRIVE APPROACHES SHALL MATCH EXISTING CONDITIONS EXCEPT CONCRETE THICKNESSES SHALL CONFORM TO THIS DETAIL. EXPANSION JOINT LOCATIONS SHALL BE APPROVED BY THE CITY.
CONCRETE DRIVEWAY APPROACH FOR VERTICAL FACE CURB & GUTTER W/ATTACHED SIDEWALK

DETAIL NO. S-27

DATE: JULY, 2015

SCALE: N.T.S.

NOTES:
1. CONTRACTION JOINTS ARE REQUIRED AT EACH END OF WARPED SECTION AND SHOULD BE EVENLY SPACED A MAXIMUM OF 10' IN EITHER DIRECTION ALONG THE DRIVEWAY.
2. APPLY LIGHT BROOM FINISH TO SURFACES.
3. DRIVEWAY SECTION SHALL BE 6" THICK ON ALL RESIDENTIAL, MULTIFAMILY RESIDENTIAL, AND 8" THICK ON ALL COMMERCIAL, INDUSTRIAL AND ALLEY DRIVEWAYS.
4. DRIVEWAY WIDTHS: 12' MIN TO 36' MAX.
5. DRIVEWAY WIDTHS FOR COMMERCIAL/INDUSTRIAL AREAS SHALL BE APPROVED BY THE CITY.
6. SHOW DIMENSIONS AND LOCATIONS OF DRIVEWAY ON CONSTRUCTION PLANS.
7. CONSTRUCTION SHALL CONFORM TO ALL ADA STANDARDS FOR SIDEWALKS.
8. RETROFIT DRIVE APPROACHES SHALL MATCH EXISTING CONDITIONS EXCEPT CONCRETE THICKNESSES SHALL CONFORM TO THIS DETAIL. EXPANSION JOINT LOCATIONS SHALL BE APPROVED BY THE CITY.
NOTES:
1. MINIMUM OF 0.6% LONGITUDINAL SLOPE FOR CROSS PANS.
2. MAXIMUM SPACING OF CONTRACTION JOINTS – TEN (10) FEET.
3. CONCRETE APRON SHALL BE POURED MONOLITHICALLY WITH CURB AND SHALL BE 8" THICK (SEE CURB RAMP DETAILS).
4. CROSS PAN AND APRON MAY BE POURED MONOLITHICALLY OR IF POURED SEPARATELY SHALL BE DOWELLED TOGETHER.
5. SEE STREET DESIGN STANDARDS FOR PERMISSIBLE LOCATIONS OF CROSS PANS.
6. MID-BLOCK CROSS PANS SHALL BE A MINIMUM OF TEN (10) FEET WIDE.
7. LARGER WIDTHS MAY BE REQUIRED BY THE CITY.
8. DOWELING MAY BE REQUIRED AT CERTAIN COLD JOINTS AT THE CITY’S DIRECTION, BASED ON SPECIAL SUBGRADE CIRCUMSTANCES.
9. CONCRETE SURFACES TO RECEIVE A LIGHT BROOM FINISH.

CONCRETE CROSS PAN DETAIL
DETAIL NO. S-28
DATE: JULY, 2015
SCALE: N.T.S.
NOTES:

1. SAWCUT, REMOVABLE PLASTIC DUMMY JOINT STRIPS OR OTHER APPROVED JOINTS AT 10' O.C.

2. EXPANSION JOINTS REQUIRED AT 200 FOOT SPACING AND ADDITIONAL JOINTS MAY BE REQUIRED AT THE DISCRETION OF THE CITY. SEE JOINT DETAILS.

3. CONCRETE SHALL BE FIBER REINFORCED AS APPROVED BY THE CITY.

4. BIKE PATHS WITH GREATER THAN 5% SLOPE SHALL REQUIRE A SPECIAL DESIGN AND MUST COMPLY WITH ALL ADA REQUIREMENTS.

5. CONCRETE SURFACES TO RECEIVE A LIGHT BROOM FINISH.
NOTES:

1. RIGHT-OF-WAY AND EASEMENT AREAS SHALL BE GRADED (CUT AND FILL) TO SUBGRADE (+/-0.5') PRIOR TO AND AFTER UTILITY INSTALLATION.

2. BACKFILL WITHIN PUBLIC RIGHT-OF-WAY AND IN EASEMENTS WITHIN 20 FEET OF RIGHT-OF-WAY SHALL BE COMPACTED TO 95% WITHIN +/- 2% OF OPTIMUM MOISTURE CONTENT AS DETERMINED BY AASHTO T99 DENSITY. TRENCHES IN EASEMENTS BEYOND 20 FEET OF RIGHT-OF-WAY SHALL BE COMPACTED TO 90%. ALL TRENCHES SHALL BE COMPACTED BY A METHOD APPROVED BY THE CITY.

3. TRENCH EXCAVATION SHALL COMPLY TO ALL OSHA STANDARDS.

4. FILTER FABRIC IS REQUIRED IF STABILIZATION MATERIAL IS USED. THE FABRIC SHALL BE INSTALLED AS SHOWN IN THE DETAIL.

5. IF NOT SPECIFIED BY APPLICABLE UTILITY, AN APPROVED GRADE OF SAND BEDDING SHALL BE INSTALLED TO SPRINGLINE.
TRENCH PATCH FOR ASPHALT PAVEMENT

1' CUTBACK OR 9" AS PER MOPEC

WARNING TAPE WILL BE INSTALLED 18" ABOVE PIPE (IF REQUIRED BY APPLICABLE UTILITY)

FLOWABLE FILL, AGGREGATE BASE, OR GEOTECH APPROVED/CONTROLLED BACKFILL (SEE SPECIFICATIONS)

18" - NO. 4 SMOOTH EXPANSION DOWELS 9" INTO EXISTING PAVEMENT AT 24" O.C. GREASE DOWEL PORTION PROTRUDING INTO THE PATCH AND EPOXY IN PLACE INTO EXISTING CONCRETE.

TRENCH CROSS SECTION IS FOR ILLUSTRATION ONLY

BEDDING ZONE

LOCAL STANDARD & LOCAL LOW VOLUME
ALLEY EMER. ACCESS RESIDENTIAL

FULL DEPTH ASPHALT (4)
5 1/2"  5 1/2"  5 1/2"

MAJOR LOCAL, COMMERCIAL & INDUSTRIAL
COLLECTOR ARTERIAL
7"  7"

NOTES:
1. USE THE LIMITS OF BEDDING SHOWN IF NOT SPECIFIED BY THE APPLICABLE UTILITY.
2. HOT MIX ASPHALT SHALL BE USED TO PATCH ASPHALT AND SHALL BE GRADE S OR SX. TACK COAT REQUIRED.
3. CONCRETE SHALL BE USED TO PATCH CONCRETE. MATCH EXISTING THICKNESS.
4. FULL DEPTH ASPHALT SHALL BE THICKNESSES AS SHOWN ABOVE OR ONE (1) INCH GREATER THAN THE EXISTING PAVEMENT THICKNESS, WHICHEVER IS GREATER.
5. PATCH MAY NOT END WITHIN THE WHEEL TRACK OF TRAVEL LANES. UP TO THREE (3) FEET OF ADDITIONAL ASPHALT PATCH WILL BE REQUIRED TO KEEP THE JOINT OUT OF THE WHEEL TRACK.
6. MINIMUM SIZE OF PATCH SHALL BE 3' X 3'.

EXISTING STREET PAVEMENT PATCH DETAIL FOR ASPHALT & CONCRETE

DETAIL NO. S-31

DATE: JULY, 2015
SCALE: N.T.S.
CONCRETE COLLAR SHALL RUN THE FULL DEPTH OF THE BOX OR 12" MINIMUM THICKNESS, WHICHEVER IS THE GREATEST.

LIMITS OF EXCAVATION

FINISHED GRADE

BASE COURSE OR FLOWABLE FILL

RANGE BOX

2 1/2" DIA. X 30" PIPE

#4 CIRCULAR REBAR 3" FROM TOP OF COLLAR

BRASS OR ALUMINUM CAP TO CONFORM TO CITY AND STATE STANDARDS. SECURELY FASTEN CAP TO THE TOP OF THE PIPE.

NOTES:

1. "D" = 1/2" FOR HOT MIX ASPHALT PAVEMENT OVERLAYS, SURFACE TREATMENTS, PAVEMENT RECONSTRUCTION OR NEW CONSTRUCTION.

2. "D" = 1/4" FOR CONCRETE STREETS.

3. THIS MONUMENT TO BE INSTALLED AT ALL ALIQUOT CORNERS.

4. SURVEY MONUMENTS SHALL CONFORM TO ALL LAND SURVEYING REQUIREMENTS AS DETERMINED BY CITY AND STATE STANDARDS.

5. RANGE BOX, CAP AND MONUMENT PIPE TO BE PURCHASED FROM THE CITY OF GREELEY.

SURVEY MONUMENT IN PAVEMENT

DETAIL NO. S-32

DATE: JULY, 2015

SCALE: N.T.S.
NOTES:

1. "D" = 1/4" FOR HOT MIX ASPHALT PAVEMENT OVERLAYS, SURFACE TREATMENTS, PAVEMENT RECONSTRUCTION OR NEW CONSTRUCTION.

2. "D" = 1/4" FOR CONCRETE STREETS.

3. VALVE BOX MUST BE PLUMB AND CENTERED OVER THE VALVE NUT.

4. THIS DETAIL APPLIES TO BOTH ASPHALT AND CONCRETE STREETS.
NOTES:

1. "D" = 1/4" FOR HOT MIX ASPHALT PAVEMENT OVERLAYS, SURFACE TREATMENTS, PAVEMENT RECONSTRUCTION OR NEW CONSTRUCTION.
2. "D" = 1/4" FOR CONCRETE STREETS.
3. A SEALER SHALL BE USED BETWEEN ALL ADJUSTING RINGS AS REQUIRED.
4. DROP-IN RISER RINGS NOT ALLOWED.
5. SET AND TILT RING AND COVER TO MATCH SLOPE OF FINISHED STREET.

MANHOLE RAISING DETAIL

DETAIL NO. S-34

DATE: JULY, 2015
SCALE: N.T.S.
NOTES:

1. HIGHWAY FONT SERIES D OR APPROVED EQUIVALENT SHALL BE USED FOR NUMERALS.

2. HIGHWAY FONT SERIES C OR APPROVED EQUIVALENT SHALL BE USED FOR LETTERING. IN SOME CASES THE LETTER SERIES MAY VARY DEPENDING ON NUMBER OF LETTERS OR NUMBERS IN THE STREET NAME.

3. STROKE WIDTH OF LETTERS SHOWN ON THIS DRAWING IS FOR ILLUSTRATIVE PURPOSE ONLY AND IS NOT INTENDED TO REPRESENT CORRECT STROKE WIDTH FOR SPECIFIED LETTER SERIES OR LETTER TO LETTER SPACING.
NOTE: NO Outlet

49th Ave Ct 2300

WHITE ON GREEN

REAR VIEW

BLACK ON YELLOW

NOTES:

1. HIGHWAY FONT SERIES D OR APPROVED EQUIVALENT SHALL BE USED FOR NUMERALS.

2. HIGHWAY FONT SERIES C OR APPROVED EQUIVALENT SHALL BE USED FOR LETTERING. IN SOME CASES THE LETTER SERIES MAY VARY DEPENDING ON NUMBER OF LETTERS OR NUMBERS IN THE STREET NAME.

3. STROKE WIDTH OF LETTERS SHOWN ON THIS DRAWING IS FOR ILLUSTRATIVE PURPOSE ONLY AND IS NOT INTENDED TO REPRESENT CORRECT STROKE WIDTH FOR SPECIFIED LETTER SERIES OR LETTER TO LETTER SPACING.

COMBINATION STREET NAME/NO OUTLET SIGN

W14–1P/D3 SPECIAL

DETAIL NO. S–36

DATE: JULY, 2015

SCALE: N.T.S.
NOTES:
1. HIGHWAY FONT SERIES D OR APPROVED EQUIVALENT SHALL BE USED FOR NUMERALS.
2. HIGHWAY FONT SERIES C OR APPROVED EQUIVALENT SHALL BE USED FOR LETTERING. IN SOME CASES THE LETTER SERIES MAY VARY DEPENDING ON NUMBER OF LETTERS OR NUMBERS IN THE STREET NAME.
3. STROKE WIDTH OF LETTERS SHOWN ON THIS DRAWING IS FOR ILLUSTRATIVE PURPOSE ONLY AND IS NOT INTENDED TO REPRESENT CORRECT STROKE WIDTH FOR SPECIFIED LETTER SERIES OR LETTER TO LETTER SPACING.

STREET NAME SIGN
D3

DETAIL NO. S-37

DATE: JULY, 2015

SCALE: N.T.S.
PAVEMENT MARKING WORDS AND SYMBOLS

LEFT TURN BAY
STACKING LENGTH LESS THAN 100'

LEFT TURN BAY
STACKING LENGTH OVER 100'

NOTE
PAVEMENT WORK AND SYMBOL MARKINGS, TRANSVERSE AND LONGITUDINAL (CONTINENTAL) CROSSWALK LINES, AND STOP LINES WILL BE PAID FOR IN SQUARE FEET USING THEIR SPECIFIC BID ITEMS.

LEFT TURN BAY PAVEMENT MARKINGS
DETAIL NO. S-39

DATE: JULY, 2015
SCALE: N.T.S.
URBAN SINGLE–LANE ROUNDBOUT

R6–1R SIGN (TYP. 4 PLACES IN ISLAND)

CROSSWALK BAR (TYP.)

W11–2 & W16–7P (TYP. AT EACH LEG)

W2–6 SIGN (TYP. AT EACH LEG)

R1–2 SIGN (TYP. AT EACH LEG)

8" WIDE SOLID WHITE LINE (TYP. AT EACH LEG)

8" WIDE WHITE DASHES—2' IN LENGTH WITH 4' GAP (TYP.)

SHARKS TEETH (TYP. AT EACH LEG)
INCORRECT STREET LIGHT PLACEMENT

STREET LIGHTS SHALL BE PLACED ON THE DOWNSTREAM SIDE OF INTERSECTION, AS VIEWED BY A MOTORIST IN THE LANE BENEATH THE LUMINAIRE.
NOTES:
1. A NO PARKING ZONE SHALL BE IDENTIFIED WITH TWO R7-107A SIGNS, OR BY PAINTING THE CURB RED, IF NEEDED. THE R7-107A SIGNS SHALL BE PLACED AT THE BEGINNING AND THE END OF THE NO PARKING ZONE.
2. A CONCRETE PAD SHALL BE CONSTRUCTED AT THE SIGN. THE PAD SHALL BE 20' LONG PARALLEL TO THE SIDEWALK, 11' WIDE PERPENDICULAR TO THE SIDEWALK WITH A 6'' DEPTH SLAB.
3. A CONCRETE SIDEWALK SHALL BE CONSTRUCTED BETWEEN THE DETACHED WALK AND THE CURB WITH A MIN. WIDTH OF 4' AND MAX. WIDTH OF 6'.

* IF THERE IS ON-STREET PARKING

STANDARD BUS STOP LOCATIONS

DETAIL NO. S-42

DATE: JULY, 2015

SCALE: N.T.S.
NOTES:
1. SIGN SHOULD BE SET AT AN ANGLE OF 90° AND VISIBLE TO APPROACHING TRAFFIC.
2. ALL SIGNS SHALL MEET THE MOST CURRENT MUTCD STANDARDS.

TYPICAL DIAMOND SIGN INSTALLATION

DETAIL NO. S-43

DATE: JULY, 2015

SCALE: N.T.S.
2' MIN. LATERAL CLEARANCE BEHIND CURB (BOTH SIDES)

SET WITH TWO TL-3806CP DRIVE RIVETS AND WITH APPROPRIATE WASHERS

TELESPEAR POST 12 GAUGE 1-3/4" X 1-3/4" X 10'

3/8" CORNER BOLT WITH 5/16" NUT (RIVET ATTACHMENT NOT ALLOWED)

2" TELESPEAR ANCHOR (WHEN SET IN CONCRETE USE A 4" PVC PIPE)

NOTES:
1. SIGN SHOULD BE SET AT AN ANGLE OF 90° INSIDE NOSE OF ISLAND AND VISIBLE TO APPROACHING TRAFFIC.
2. ALL SIGNS SHALL MEET THE MOST CURRENT MUTCD STANDARDS.

TYPICAL ISLAND SIGN INSTALLATION
DETAIL NO. S-44

DATE: JULY, 2015
SCALE: N.T.S.
NOTES:

1. SIGN SHOULD BE SET AT AN ANGLE OF NOT LESS THAN 30°, OR MORE THAN 45°, WITH THE LINE OF TRAFFIC FLOW TO BE VISIBLE TO APPROACHING TRAFFIC.

2. ALL SIGNS SHALL MEET THE MOST CURRENT MUTCD STANDARDS.
STOP
4-WAY

STREET

2' MIN. LATERAL CLEARANCE BEHIND CURB AND/OR SIDEWALK

R1-1

STREET NAME SIGN PER DETAILS

SET WITH TWO TL-3806CP DRIVE RIVETS AND WITH APPROPRIATE WASHERS

TELESPEAR POST 12 GAUGE 1-3/4" X 1-3/4" X 10'

3/8" CORNER BOLT WITH 5/16" NUT (RIVET ATTACHMENT NOT ALLOWED)

4 TO 5''

3' STUB

2'' TELESPEAR ANCHOR (WHEN SET IN CONCRETE USE A 4'' PVC PIPE)

NOTES:
1. SIGN SHOULD BE SET AT AN ANGLE OF 90' AND BE VISIBLE TO APPROACHING TRAFFIC.
2. ALL SIGNS SHALL MEET THE MOST CURRENT MUTCD STANDARDS.

TYPICAL STOP SIGN INSTALLATION

DETAIL NO. S-46

DATE: JULY, 2015
SCALE: N.T.S.
EXEMPLARY:

LEGEND:

R1-1 STOP SIGN
R3-2 NO LEFT TURN SYMBOL
R6-1R ONE-WAY ARROW RIGHT
OM-3L RIGHT BRIDGEBOARD
D3-1 STREET/AVENUE SIGN
R3-7R RIGHT LANE MUST TURN RIGHT
R4-7 KEEP RIGHT OF ISLAND SYMBOL

NOTE:

THIS IS A GENERAL LAYOUT. SIGNS SHALL BE INSTALLED AT EXACT LOCATIONS PER PLANS AND WITH MATERIALS PER STANDARD SPECIFICATIONS.

TYPICAL STREET SIGN PLACEMENT

DETAIL NO. S-47

DATE: JULY, 2015

SCALE: N.T.S.
NOTES:

1. THIS IS A GENERAL LAYOUT. SIGNS SHALL BE INSTALLED AT EXACT LOCATIONS PER PLANS AND WITH MATERIALS PER STANDARD SPECIFICATIONS.

2. MEDIAN ISLAND CURB AND GUTTER TO BE CITY STANDARD 6" VERT. FACE CURB WITH REVERSE SLOPE GUTTER. THE CONTRACTOR SHALL WIDEN THE GUTTER TO 24 INCHES AND CONVERT TO IN-FLOW GUTTER ALONG MAIN ROADWAY.

3. ALL RADII ARE FLOWLINE OR FACE OF CURB.

RIGHT IN/RIGHT OUT LAYOUT
SHEET 2 OF 2
DETAIL NO. S-48

DATE: APRIL, 2016
SCALE: N.T.S.
### STANDARD VEHICLE

<table>
<thead>
<tr>
<th>A</th>
<th>0°</th>
<th>23</th>
<th>8</th>
<th>23</th>
<th>20</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>30°</td>
<td>8.5</td>
<td>20</td>
<td>17.4</td>
<td>17</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>45°</td>
<td>8.5</td>
<td>20</td>
<td>20.2</td>
<td>12</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>60°</td>
<td>9</td>
<td>19</td>
<td>21</td>
<td>10.4</td>
<td>24</td>
<td>20</td>
</tr>
<tr>
<td>90°</td>
<td>9</td>
<td>19</td>
<td>19</td>
<td>9</td>
<td>24</td>
<td>NA</td>
</tr>
</tbody>
</table>

### COMPACT VEHICLE

<table>
<thead>
<tr>
<th>A</th>
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<th>7.5</th>
<th>19</th>
<th>7.5</th>
<th>19</th>
<th>20</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>30°</td>
<td>7.5</td>
<td>16.5</td>
<td>14.8</td>
<td>15</td>
<td>20</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>45°</td>
<td>7.5</td>
<td>16.5</td>
<td>17</td>
<td>10.6</td>
<td>20</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>60°</td>
<td>8</td>
<td>16</td>
<td>17.9</td>
<td>9.2</td>
<td>24</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>90°</td>
<td>8</td>
<td>15</td>
<td>15</td>
<td>8</td>
<td>24</td>
<td>NA</td>
<td></td>
</tr>
</tbody>
</table>

*UNDER SPECIAL CONDITIONS, THESE DIMENSIONS COULD BE VARIED WITH THE LOCAL ENTITY'S APPROVAL. STALL LENGTH (ONLY) CAN BE REDUCED BY 2 FT. WHEN OVERHANGING IS PROVIDED. FOR HANDICAP SPACES, WIDTH SHALL BE 13 FT. WITH RAMP ACCESS TO WALKS.*

---

**A** - ANGEL OF PARKING  
**B** - STALL WIDTH  
**C** - STALL LENGTH  
**D** - STALL DEPTH  
**E** - CURB LENGTH  
**F** - TOW-WAY DRIVE WIDTH OR DOUBLE LOADED DRIVE WIDTH  
**G** - ONE-WAY DRIVE WIDTH OR SINGLE LOADED DRIVE WIDTH
NOTE: When $V_O < 400$ VPH (dashed line), a Left-Turn Lane is not normally warranted unless the advancing volume ($V_A$) in the same direction as the Left-turning traffic exceeds 400 VPH ($V_A > 400$ VPH).

1. Left turn lanes are required at all intersections and all-movement accesses on arterial roadways except where roundabouts are provided.
**L_{tb} - Length of Taper and Lane for Deceleration and Braking (ft)**

**Functional Basis:** To provide sufficient length for a vehicle to decelerate and brake entirely outside the through traffic lanes.

**Desirable Design:** Deceleration in gear for 3 seconds (occurs over bay taper) followed by comfortable braking to a stopped position.

<table>
<thead>
<tr>
<th>Speed (mph)</th>
<th>Total</th>
<th>Lane</th>
<th>Taper</th>
</tr>
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<tbody>
<tr>
<td>30</td>
<td>235</td>
<td>115</td>
<td>(120)</td>
</tr>
<tr>
<td>40</td>
<td>315</td>
<td>155</td>
<td>(160)</td>
</tr>
<tr>
<td>50</td>
<td>435</td>
<td>235</td>
<td>(200)</td>
</tr>
<tr>
<td>60</td>
<td>530</td>
<td>290</td>
<td>(240)</td>
</tr>
</tbody>
</table>

**L_{s} - Length of Lane for Storage (Full Width Lane)**

**Functional Basis:** To provide sufficient length for a reasonable number of vehicles to queue within the lane without affecting other lanes.

**Desirable Design:** Based on twice the mean arrival rate (per cycle for signals, per 2-minute period for stop control) during the peak hour of traffic.

**Minimum Design:** Based on the mean arrival rate, with minimum storage for one vehicle.

<table>
<thead>
<tr>
<th>DHV (vph)</th>
<th>L_{s} (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤60</td>
<td>50–75</td>
</tr>
<tr>
<td>61–120</td>
<td>100</td>
</tr>
<tr>
<td>121–180</td>
<td>150</td>
</tr>
<tr>
<td>&gt;180</td>
<td>200 or more</td>
</tr>
</tbody>
</table>

**Minimum Design:** Braking begins at 2/3 full lane width, with minimum 50-foot storage. For low speeds only, the following values apply:

<table>
<thead>
<tr>
<th>Speed (mph)</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>230</td>
</tr>
<tr>
<td>35</td>
<td>250</td>
</tr>
<tr>
<td>40</td>
<td>280</td>
</tr>
<tr>
<td>45</td>
<td>320</td>
</tr>
</tbody>
</table>

**Design Values for L_{s} for Stop Control**

**Graph Image:**

---

**LEFT TURN LANE DESIGN GUIDELINES**

**SHEET 2 OF 3**

**DETAIL NO. S-50**

**DATE:** JULY, 2015  
**SCALE:** N.T.S.
Approach Taper Design (ft) (Redirect Taper)

**Functional Basis:** To provide a smooth lateral transition for all vehicles approaching the intersection.

**Form of Alignment:** Tangent

**Low Speed Design:** (<45) Provide a fully shadowed lane.

\[ T_a = \frac{wS^2}{60} \]

- \( W = \) Width of offset (ft)
- \( S = \) Speed (mph)

**High Speed Design:** (≥45mph) Provide a fully shadowed lane. Design as follows:

\[ T_a = ws \]

- \( W = \) Width of offset (ft)
- \( S = \) Speed (mph)

**Typical Values for \( T_a \)**

<table>
<thead>
<tr>
<th>Speed (mph)</th>
<th>11</th>
<th>11.5</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>115</td>
<td>120</td>
<td>125</td>
</tr>
<tr>
<td>30</td>
<td>165</td>
<td>170</td>
<td>180</td>
</tr>
<tr>
<td>35</td>
<td>225</td>
<td>235</td>
<td>245</td>
</tr>
<tr>
<td>40</td>
<td>295</td>
<td>305</td>
<td>320</td>
</tr>
</tbody>
</table>

*Rounded to nearest 5 ft.*

**Taper Bay Design (ft)**

**Functional Basis:** To direct left-turning vehicles into the turn lane

**Form of Alignment:** Tangent; or reverse curves with 1/3 of the total length comprised of a central tangent.

**Desirable Design:** For fully shadowed left turn lane.

\[ T_b = \frac{w_1s}{3} \]

- \( W_1 = \) Width of lane (ft)
- \( S = \) Speed (mph)

**Typical Values for \( T_b \)**

<table>
<thead>
<tr>
<th>Speed (mph)</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>110</td>
<td>120</td>
</tr>
<tr>
<td>30</td>
<td>145</td>
<td>160</td>
</tr>
<tr>
<td>40</td>
<td>180</td>
<td>200</td>
</tr>
</tbody>
</table>

*Rounded to nearest 5 ft.*

**Minimum Design:** Taper ratios of 8:1 can be used for tangent bay tapers in constrained locations.
NOTE:
1. Right turn lanes are required on 6-lane arterial when the right turn volume exceeds 200 vph.
**L<sub>d/b</sub>** - Length of Taper and Lane for Deceleration and Braking (ft)

**Functional Basis:** To provide sufficient length for a vehicle to decelerate and brake entirely outside the through traffic lanes.

**Desirable Design:** Deceleration in gear for 3 seconds (occurs over bay taper) followed by comfortable braking to a stopped position or to the design speed of the corner radius.

\[ T_b = \frac{W_1 S}{3} \]

\[ W_1 = \text{Width of Lane} \]
\[ S = \text{Speed (mph)} \]

**Bay Taper Length**

\[ T_b = \frac{W_1 S}{3} \]

**T<sub>b</sub>** - Bay Taper Design

**Functional Basis:** To direct right-turning vehicles into the turn lane.

**Form of Alignment:** Tangent; or reverse curves with 1/3 of the total length comprised of a central tangent.

**Desirable Design:** For fully shadowed right turn lane.

**L<sub>s</sub>** - Length of Lane for Storage (Full Lane Width) (ft)

**Functional Basis:** To provide sufficient length for a reasonable number of vehicles to queue within the lane without affecting other lanes.

**Desirable Design:** Based on twice the mean arrival rate (per cycle for signals, per 2-minute period for stop control) during the peak hour of traffic.

**Minimum Design:** Based upon the mean arrival rate, with minimum storage for one vehicle.

**Design Values for L<sub>d/b</sub>**

<table>
<thead>
<tr>
<th>Highway Design Speed, V (mph)</th>
<th>Design Speed of Corner Radius (mph)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Stop Condition</em></td>
<td>15 20 25 30</td>
</tr>
<tr>
<td>30</td>
<td>185 160 140 –</td>
</tr>
<tr>
<td>35</td>
<td>275 240 213 188 93</td>
</tr>
<tr>
<td>40</td>
<td>315 295 265 235 185</td>
</tr>
<tr>
<td>45</td>
<td>375 350 325 295 250</td>
</tr>
<tr>
<td>50</td>
<td>435 405 385 355 315</td>
</tr>
</tbody>
</table>

*Appropriate for right turn lanes in approaches to stop signs and traffic signals.

**Typical Values for T<sub>b</sub>**

<table>
<thead>
<tr>
<th>Speed (mph)</th>
<th>S -</th>
<th>W - Width of Offset (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>110</td>
<td>120</td>
</tr>
<tr>
<td>40</td>
<td>145</td>
<td>160</td>
</tr>
<tr>
<td>50</td>
<td>185</td>
<td>200</td>
</tr>
</tbody>
</table>

*Rounded to nearest 5 ft.

Minimum Design: Taper ratios of 8:1 can be used for tangent bay tapers in constrained locations.

**L<sub>s</sub> for Stop Control**

<table>
<thead>
<tr>
<th>DHV (vph)</th>
<th>L&lt;sub&gt;s&lt;/sub&gt; (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤60</td>
<td>50–75</td>
</tr>
<tr>
<td>61–120</td>
<td>100</td>
</tr>
<tr>
<td>121–180</td>
<td>150</td>
</tr>
<tr>
<td>&gt;180</td>
<td>200 or more</td>
</tr>
</tbody>
</table>

Reference NCHRP 279
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR MARKING OF UNDERGROUND MEMBER UTILITIES.
Construction must be in accordance with applicable City of Greeley Construction Standards. The City’s acceptance allows for plan distribution and permit application. The City’s acceptance shall not relieve the design engineer’s responsibility for errors, omissions, or design deficiencies for which the City is held harmless.

Accepted by: _______________________________ _____________
City Engineer Date

Accepted by: _______________________________ _____________
Water/Sewer Director Date

Accepted by: _______________________________ _____________
Greeley Fire Chief Date