NOTES:

1. Delineator shall be measured and paid for at the contract unit price each, and shall include all materials and labor necessary for one complete installation.

DELINEATORS ON CONCRETE BARRIERS

2. CODE PAY ITEM PAY UNIT
1984 Delineator for Barrier - White Each
1985 Delineator for Barrier - Yellow Each
Delineators on Guardrail
1982 Delineator for Guardrail - White Each
1983 Delineator for Guardrail - Yellow Each

3. The Delineators shall be yellow in color when the barrier is placed in the median and/or on the left side of the driving lane. The Delineators shall be white in color when the barrier is placed on the right side of the driving lane.

4. Delineators shall be applied 300 feet in advance of and throughout the length of all bridges that do not have full width shoulders. Spacing on bridges and 300 feet in advance of bridges shall be 50 feet on centers. The first delineator on the guardrail shall be placed 50 feet from the delineator at the end of the bridge. Delineators shall be installed in accordance with the manufacturer's recommendations.

5. When concrete barriers extend across narrow shoulder width structures in lieu of steel beam guardrail, delineators shall be installed at same vertical alignment as on the guardrail and delineators shall comply with current STD. DWG. RBM-020.

6. Guardrail delineators may be Akt Corporations model no. 567 mono-directional or approved equal.

7. See Section 718 of the current standard specifications for "Object Marker Type 2".
NOTES
1. DELINEATOR SHALL BE MEASURED AND PAID FOR AT THE CONTRACT UNIT PRICE EACH, AND SHALL INCLUDE ALL MATERIALS AND LABOR NECESSARY FOR ONE COMPLETE INSTALLATION.

2. CODE
   PAY ITEM
   PAY UNIT
   1982   DELINEATOR FOR GUARDRAIL - WHITE   EACH
   1983   DELINEATOR FOR GUARDRL - YELLOW   EACH

3. GUARDRAIL DELINEATORS SHALL BE REQUIRED ON ALL ROADWAYS WITH SHOULDERS 6'-0" IN WIDTH OR LESS AND AT OTHER LOCATIONS WHERE THE GUARDRAIL LEADS INTO HORIZONTAL CURVES OF LESS THAN 950 FEET RADIUS.

4. DELINEATORS SHALL BE MANUFACTURED FROM 12 GA. GALVANIZED STEEL.

5. DIMENSIONS SHOWN ARE APPROXIMATE AND ARE SUBJECT TO MANUFACTURER'S TOLERANCES.

6. WHEN CONCRETE BARRIERS EXTEND ACROSS BRIDGE STRUCTURES IN LIEU OF STEEL BEAM GUARDRAIL, DELINEATORS SHALL BE INSTALLED AT SAME VERTICAL ALIGNMENT AS ON THE GUARDRAIL AND DELINEATORS SHALL COMPLY WITH CURRENT STD. DWG. RBM-020.

DELINER SPACING ON HORIZONTAL CURVES

<table>
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<tr>
<th>DEGREE OF CURVE</th>
<th>SPACING ON CURVES</th>
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<tr>
<td>( \leq 2^\circ )</td>
<td>100'</td>
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<tr>
<td>( &gt; 2^\circ \leq 4^\circ )</td>
<td>75'</td>
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<tr>
<td>( &gt; 4^\circ )</td>
<td>50'</td>
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SPACING ON TANGENTS = 100' INTERVALS
PLAN VIEW

20'-0"

5-NO. 4 "B" BARS 4'-3" O.C.

1'-6"

2 - NO. 4 "B" BARS

1'-4"

2 - NO. 4 "B" BARS

1'-6"

1-NO. 6 BAR 19'-11" LONG

1'-6"

TOP CONNECTOR
2'/2"

1'-6"

2'/2"

BOTH CONNECTOR
2'/2"

5'-0"

DRAIN SLOTS
2" X 1'-8"

6'-0"

ELEVATION VIEW

TOP CONNECTOR
(HOT DIP GALVANIZE AFTER FORMING)

1'/4" R MIN.

3/4" STEEL BAR

1'/4" GALV. REQD.

6" GALV. REQD.

BOTTOM CONNECTOR
(HOT DIP GALVANIZE AFTER FORMING)

1'/4" R MIN.

3/4" STEEL BAR

1'/4" GALV. REQD.

6" GALV. REQD.

1'/8" HEAVY HEX NUTS

1'/8" STEEL ROD

STEEL WASHER

STEEL WASHER

3" THD. LENGTH (MIN.)

CONNECTOR PIN

1'/8" THICK STEEL WASHER

APPROXIMATE QUANTITIES

20'

REINF. CONC. WEIGHT

LBS. CU. YD./FT. TONS

195 0.12 5.0

FOR TEMPORARY USE ONLY

KENTUCKY DEPARTMENT OF HIGHWAYS

CONCRETE BARRIER WALL TYPE 9T (TEMPORARY)

~ NOTES ~

BID ITEM AND UNIT TO BID:
CONC. BARRIER WALL TYPE 9T - LIN. FT.

1. 2" DIA. LIFTING HOLE - 2 REQUIRED EACH SECTION.
FORMED WITH 2" P.V.C. PIPE OR EQUAL.

2. TAPER NOT INCLUDED IN BASE WIDTH.

3. SHOP DRAWINGS SHALL BE APPROVED PRIOR TO MANUFACTURE.

4. BASED ON 1500 LBS./CU. FT.

5. PLACE ALL STEEL REINFORCEMENT A CLEAR DISTANCE OF 2" MIN.
FROM OUTSIDE FACE OF WALL, EXCEPT WHERE SHOWN OTHERWISE.

6. LIFTING BARS SHALL BE REQUIRED TO PREVENT SPALLING OF CONCRETE AROUND HOLES.

7. PREVIOUS WALL MANUFACTURED ACCORDING TO STANDARD DRAWING RBM-I5-07 MAY STILL BE USED.
ANY NEW BARRIER WALL TYPE 9T MANUFACTURED SHALL COMPLY TO THIS STANDARD DRAWING.

8. A PERMISSIBLE ALTERNATE FOR THE PIN AND LOOP CONNECTOR IS JJ HOOK MANUFACTURED BY EASI-SET INDUSTRIES OUT OF MIDLAND, VA.
SEE MANUFACTURER'S SHOP DRAWINGS FOR DETAILS ON JJ HOOK CONNECTOR AND RECOMMENDED REINFORCEMENT.
THE BARRIER WALL'S SHAPE, LENGTH, DRAIN SLOT DIMENSIONS AND LOCATIONS SHALL MATCH THIS DRAWINGS CURRENT DIMENSIONS.
NOTE: SEE SIGN DETAIL SHEETS FOR QUANTITY, LENGTH, SIZE AND GAUGE OF TYPE I POSTS.

TYPICAL SHEETING SIGN BREAKAWAY SUPPORT INSTALLATION

NOTES
1. AUGER AN 18" DIA. HOLE BY 42" DEEP AT THE PREDETERMINED LOCATION.
3. DEPTH OF IMBEDMENT TO LEAVE 2/3" FROM THE GRADE TO THE TOP OF THE BASE.
4. ALLOW CONCRETE TO CURE AT LEAST 5 DAYS BEFORE ERECTING SIGN.
5. PLACE EACH TEFLOM COATED WASHER SHIM ON EACH OF THE 3 NOTCHED POINTS, WITH THE OPEN SIDE FACING TOWARDS THE CENTER OF THE TRIANGLE.
6. PLACE TOP POST RECIIVER SO THAT THE SIGN POST IS IN CORRECT POSITION FOR VISIBILITY, ON TO THE BASE AND WASHER SHIMS.
7. PLACE EACH 1/2" WASHER ONTO TORQUE FREE BOLT AND PLACE IN EACH NOTCHED POINT OF THE TRIANGLE. PUSH EACH TEFLOM COATED WASHER SHIM AGAINST THE SHANK OF EACH BOLT AND FINGER TIGHTEN 1/2" FLANGED LOCK NUT.
8. FULLY TIGHTEN, THEN LOOSEN, ALL THREE TORQUE FREE BOLTS USING THE LARGER 1/2" HEX HEAD. COMPLETE BY TIGHTENING EACH BOLT USING THE SMALLER 3/8" HEX HEAD UNTIL IT TWIST OFF. NOTE: SECONDARY HEAD WILL TWIST OFF AT DESIRED TORQUE LEVEL TO MEET FEDERAL COMPLIANCE.
NOTE: ON MULTI-LEG INSTALLATIONS, BE SURE THAT ALL ANCHORS ARE SQUARED AND LINED UP WITH EACH OTHER.
10. TYPE D BREAKAWAY SIGN SUPPORT SYSTEMS FOR THE TYPE I POSTS SHALL BE SELECTED FROM THE KENTUCKY DEPARTMENT OF HIGHWAYS APPROVED MATERIALS LIST. OR AN APPROVED EQUAL ACCEPTABLE ALTERNATES SHALL BE APPROVED BY THE DIVISION OF HIGHWAY DESIGN AND FHWA, PRIOR TO INSTALLATION.

MATERIALS: TUBE RECEIVER - 3" X 3" X 7 GA. ASTM A500 GRADE B TUBE PLATE - ASTM A572 GRADE 50

TOP POST RECEIVER / FOR 1/2" SQUARE POST
2-1/2" x 12 GA. MAYBE INSERTED INTO 2-1/2" X 12 GA. FOR ADDITIONAL WINDLOAD

MATERIALS: TUBE - 3" X 3" X 7 GA. ASTM A500 GRADE B TUBE PLATE - ASTM A572 GRADE 50
MATERIALS:
WOVEN-WIRE FABRIC SHALL BE EITHER ALUMINUM-COATED STEEL NO. 1047-6-9 OR ZINC-COATED STEEL NO. 1047-6-9.
ALL FENCE FITTINGS SHALL COMPLY WITH ASTM F 626.
NPS = NOMINAL PIPE SIZE - ASTM F1083 AND F1043 (HEAVY INDUSTRIAL FENCE) SHALL GOVERN.
1. STUDDED "T" POST SHALL COMPLY WITH ASTM A 702 AT 1.33 LBS. PER FOOT
   OR
   ROLL FORM POST AT 1.40 LBS. PER FOOT (SEE DETAIL)
2. NOT REQUIRED FOR ROLL FORM POST.
CONSTRUCTION SEQUENCE "A"

1. Construct embankment to slopes A, B, F, and G such that no uncompactsed or loose material shall remain.
2. Excavate for end-bent to C, D, E, and F.
3. Install piles (or other foundation).
4. Place 2" mortar bed or any class concrete.
5. Construct concrete end-bent.
6. Install 4" perforated underdrain pipe and backfill.
7. Backfill to C, D, E, F, G, Z, and J.

CONSTRUCTION SEQUENCE "B"

2. Install piles (or other foundation).
3. Place 2" mortar bed or any class concrete.
4. Construct concrete end-bent.
5. Install 4" perforated underdrain pipe and backfill.
6. Backfill to finished grade.

NOTES

1. CONSTRUCTION SEQUENCE "B" IS A PERMITTED ALTERNATE ONLY WHEN GRANULAR OR ROCK EMBANKMENT IS REQUIRED.
2. 2" MORTAR BED OR ANY CLASS CONCRETE.
3. 4" PERFORATED UNDERDRAIN PIPE WRAPPED WITH GEOTEXTILE FABRIC FOR DRAINING THE EXCAVATED TRENCH AND STRUCTURE GRANULAR BACKFILL.
4. ACCEPTABLE ALTERNATE FOR TEMPORARY SLOPE (CONSTRUCTION SEQUENCE "B").
5. SHADED PORTIONS AND REPRESENT LIMITS OF NON-ERODIBLE GRANULAR EMBANKMENT.
6. SLOPES ARE EQUAL.
7. H = EMBANKMENT HEIGHT MEASURED FROM SUBGRADE ELEVATION AT POINT 2 TO THE LOWEST ELEVATION AT THE TOE OF THE SLOPE.
8. LIMITS OF EMBANKMENT CONSTRUCTION (H/2 OR 50' MIN.) REQUIRING 2' MAX LIFT THICKNESS.
9. SEE CURRENT SPECIAL PROVISION NO. 69 FOR CONSTRUCTION AND MATERIAL REQUIREMENTS, METHOD OF MEASUREMENT AND BASIS OF PAYMENT.
10. STRUCTURE GRANULAR BACKFILL PLACED AS A COMPLETE SEPARATE OPERATION AFTER CONSTRUCTION OF ALL OTHER EMBANKMENT.
11. NO INDIVIDUAL FRAGMENTS LARGER THAN 4 INCHES IN ANY DIMENSION PERMITTED WITHIN 2'-0" OF THE STRUCTURE.
12. PLACE GEOTEXTILE FABRIC, TYPE IV PRIOR TO PLACING STRUCTURE GRANULAR BACKFILL (WITH SOIL EMBANKMENT ONLY) AND AGGREGATE BASE COURSE (WITH ALL EMBANKMENT MATERIALS).
1. STIFFENED BARRIER WALL IS REQUIRED IN WORK ZONES WHEN BARRIER WALL IS LOCATED WITHIN 3'-0" OF BRIDGE DECK EDGE PARALLEL TO THE DIRECTION OF TRAFFIC, MAY ALSO BE USED IN OTHER TEMPORARY SITUATIONS WHERE SUBSTANTIAL DROP OFFS EXIST.
2. STIFFENER SHALL BE INSTALLED WHEN BARRIER IS SET AND BEFORE TRAFFIC IS LET NEAR IT.
3. SQUARE TUBING SHALL BE 50 GRADE STRUCTURAL STEEL.
4. WHEN BARRIERS ARE PLACED ON A RADIUS, THE AREA BETWEEN THE SQUARE TUBING AND BARRIER WALL SHALL BE SHIMMED AS SHOWN ABOVE.
5. BEVEL WASHER TO BE PARALLEL WITH PLANE OF BARRIER AND BOLT HEAD. (TYP.)
6. ALL MATERIALS, LABOR INVOLVED WITH THIS PROCESS TO BE INCIDENTAL TO CONCRETE BARRIER WALL TYPE 9T.
7. SHIM SHALL CONSIST OF ONE SQUARE PLATE (4" NEAR JOINT, 8" NEAR END OF BEAMS) \( \frac{3}{8} \)" THICK WITH AS MANY 3/4" DIA. X \( \frac{3}{8} \)" THICK WASHERS AS NEEDED.
8. ROD PERPENDICULAR TO BARRIER WALL SURFACE. (TYP.)
| PIPE DIA. (IN) | PIPE TYPE       | CIRCULAR PIPE COVER HEIGHTS IN FEET |
|              |                | 2-5  | 10  | 15  | 20  | 25  | 30  | 35  | 40  | 45  | 50  | 55  | 60  | 65  |
| 12 & 15      | 2¾” x ½” CSHS  | 16 GA. |      |     |     |     |     |     |     |     |     |     |     |     |
|              | PVC: SMOOTH WALL (SOLID WALL) |      | | | | | | | | | | | | |
|              | HDPE           | FF   |     |     |     |     |     |     |     |     |     |     |     |     |
|              | RCP: (1)       |      |     |     |     |     |     |     |     |     |     |     |     |     |
| 18           | 2¾” x ½” CSHS  | 16 GA. |      |     |     |     |     |     |     |     |     |     |     |     |
|              | PVC: RIBBED (PROFILE WALL) |      | | | | | | | | | | | | |
|              | HDPE           | FF   |     |     |     |     |     |     |     |     |     |     |     |     |
|              | RCP: (1)       |      |     |     |     |     |     |     |     |     |     |     |     |     |

**NOTES**

1. GAGES FOR CORRUGATED STEEL PIPE ITEMS SHOWN ARE BASED ON ALUMINUM-COATED TYPE 2 STEEL AS PER AASHTO M-274. ALUMINUM COATED TYPE 2 STEEL IS ONLY PERMITTED IN PIPE RANGES OF 8 TO 9.

2. WHEN CORRUGATED STEEL PIPE IS ZINC COATED (GALVANIZED) THE GAGE SHALL BE ONE GAGE HEAVIER THAN SHOWN IN THE TABLES.

3. CSP, CAP, SRS AND SRA ARE SHOWN IN GAGE.

4. MAXIMUM COVER HEIGHT MEASURED FROM TOP OF PIPE TO SUBGRADE ELEVATION SHALL GOVERN GAGE OF PIPE TO BE USED FOR ENTIRE LENGTH OF PIPE INSTALLATION.

5. MINIMUM COVER HEIGHTS FOR PIPE SHALL BE 2 FEET. GAGE OF PIPE FOR COVER HEIGHTS LESS THAN 2 FEET SHALL BE THAT SHOWN FOR COVER HEIGHTS OF 30 FEET (SEE STD. SPECIFICATIONS FOR BACKFILL). HDPE AND PVC SHALL NOT BE PERMITTED FOR COVER HEIGHTS LESS THAN 2 FEET.

6. 24” DIA. PIPE IS MINIMUM SIZE FOR COVER HEIGHTS FROM 30 FEET TO 65 FEET.

7. MINIMUM COVER HEIGHT FOR ENTRANCE PIPE SHALL BE 0.5 FEET.

8. GAGE OF ENTRANCE PIPE FOR COVER HEIGHTS LESS THAN 2 FEET SHALL MEET THE FOLLOWING REQUIREMENTS:
   a. GAGE OF CSP SHALL BE THAT SHOWN FOR HEIGHTS OF 30 FEET.
   b. GAGE OF CAP SHALL BE ONE GAGE HEAVIER THAN SHOWN IN THE TABLE.

9. ALL CIRCULAR STRUCTURAL PLATE SHALL BE 5% VERTICALLY ELONGATED.

10. SEE CURRENT STANDARD DRAWING RD1-035 FOR COATINGS, LININGS AND PAVINGS FOR NON-STRUCTURAL PIPE.

11. SEE DETAIL SHEET "PIPE BEDDING FOR CULVERTS, ENTRANCE, AND STORM SEWER REINFORCED CONC. PIPE" AND DETAIL SHEET "PIPE BEDDING TRENCH CONDITION REINFORCED CONC. PIPE" FOR RCP COVER HEIGHT AND BEDDING REQUIREMENTS.

**LEGEND**

- CSPH: CORRUGATED STEEL PIPE WITH HELICAL LOCK SEAM OR HELICAL WELDED SEAM (HELICAL CORR.)
- CSPLS: CORRUGATED STEEL PIPE WITH LONGITUDINAL RIVETED OR SPOT WELDED SEAM (ANNUAL CORR.)
- CAPHS: CORRUGATED ALUMINUM ALLOY PIPE WITH HELICAL LOCK SEAM (HELIICAL CORR.)
- HDPE: HIGH DENSITY POLYETHYLENE PIPE
- PVC: POLYVINYL CHLORIDE
- SRS: SPIRAL RIB STEEL
- SRA: SPIRAL RIB ALUMINUM
- RCP: CIRCULAR REINFORCED CONCRETE PIPE
- FF: FLOWABLE FILL REQUIRED

**KENTUCKY DEPARTMENT OF HIGHWAYS**

**CULVERT, ENTRANCE & STORM SEWER PIPE TYPES & COVER HEIGHTS**

**SHEET 1 OF 8**

**APPROVED 04-25-08**

**009**
<table>
<thead>
<tr>
<th>PIPE DIA. (IN)</th>
<th>PIPE TYPE</th>
<th>CIRCULAR PIPE COVER HEIGHTS IN FEET (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2 3/4&quot; x 3/4&quot; CPHS</td>
<td>16 GA.</td>
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<tr>
<td>2 3/4&quot; x 3/4&quot; CPHS</td>
<td>16 GA.</td>
<td>12 GA.</td>
</tr>
<tr>
<td>SRS</td>
<td>16 GA.</td>
<td>14 GA.</td>
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<tr>
<td>SRA</td>
<td>16 GA.</td>
<td>14 GA.</td>
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<tr>
<td>PVC</td>
<td>RIBBED (PROFILE WALL)</td>
<td>FF</td>
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<td>HDPE</td>
<td>FF</td>
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<tr>
<td>RCP</td>
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</tbody>
</table>

|               | 2 3/4" x 3/4" CPHS | 14 GA. | 12 GA. | 10 GA. |
| 2 3/4" x 3/4" CPHS | 14 GA. | 12 GA. | 10 GA. |
| SRS           | 14 GA. | 12 GA. |
| SRA           | 14 GA. | 12 GA. | 10 GA. |
| PVC           | RIBBED (PROFILE WALL) | |
| HDPE          | FF |
| RCP           | 10 |

|               | 2 3/4" x 3/4" CPHS | 14 GA. | 12 GA. | 10 GA. |
| 2 3/4" x 3/4" CPHS | 14 GA. | 12 GA. | 10 GA. |
| SRS           | 14 GA. | 12 GA. |
| SRA           | 12 GA. | 10 GA. |
| PVC           | RIBBED (PROFILE WALL) | |
| HDPE          | |
| RCP           | 10 |

**NOTES**

1. GAGES FOR CORRUGATED STEEL PIPE ITEMS SHOWN ARE BASED ON ALUMINUM-COATED TYPE 2 STEEL AS PER AASHTO M-274. ALUMINUM COATED TYPE 2 STEEL IS ONLY PERMITTED IN PH RANGES OF 5 TO 9.
2. WHEN CORRUGATED STEEL PIPE IS ZINC COATED (GALVANIZED) THE GAGE SHALL BE ONE GAGE HEAVIER THAN SHOWN IN THE TABLES.
3. SEE CURRENT STANDARD DRAWING RDI-001 FOR EXPLANATION OF COVER HEIGHTS LESS THAN 2 FEET.
4. CSP, CAP, SRS AND SRA ARE SHOWN IN GAGE.
5. MAXIMUM COVER HEIGHT MEASURED FROM TOP OF PIPE TO SUB GRADE ELEVATION SHALL GOVERN GAGE OF PIPE TO BE USED FOR ENTIRE LENGTH OF PIPE INSTALLATION.
6. MINIMUM COVER HEIGHT FOR ENTRANCE PIPE SHALL BE 0.5 FEET.
7. ALL CIRCULAR STRUCTURAL PLATE SHALL BE 5% VERTICALLY ELONGATED.
8. ENTRANCE PIPE GREATER THAN 30" DIA. SHALL BE CULVERT PIPE.
9. SEE CURRENT STANDARD DRAWING RDI-035 FOR COATINGS, LININGS AND PAVINGS FOR NON-STRUCTURAL PIPE.
## CIRCULAR PIPE COVER HEIGHTS IN FEET

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<td>2 1/2&quot; x 3/4&quot; CSPHS</td>
<td>14 GA.</td>
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<td>SRS</td>
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<td>SRS</td>
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### NOTES

1. GAGES FOR CORRUGATED STEEL PIPE ITEMS SHOWN ARE BASED ON ALUMINUM-COATED TYPE 2 STEEL AS PER AASHTO M-274. ALUMINUM COATED TYPE 2 STEEL IS ONLY PERMITTED IN PHY RANGES OF 5 TO 9.
2. WHEN CORRUGATED STEEL PIPE IS ZINC COATED (GALVANIZED) THE GAGE SHALL BE ONE GAGE HEAVIER THAN SHOWN IN THE TABLES.
3. SEE CURRENT STANDARD DRAWING RDI-001 FOR EXPLANATION OF COVER HEIGHTS LESS THAN 2 FEET.
4. CSP, CAP, SRS AND SRA ARE SHOWN IN GAGE.
5. MAXIMUM COVER HEIGHT MEASURED FROM TOP OF PIPE TO SUBGRADE ELEVATION SHALL GOVERN GAGE OF PIPE TO BE USED FOR ENTIRE LENGTH OF PIPE INSTALLATION.
6. ALL CIRCULAR STRUCTURAL PLATE SHALL BE 5% VERTICALLY ELONGATED.
7. 54" DIA. PIPE IS MINIMUM SIZE FOR COVER HEIGHTS GREATER THAN 65 FEET.
8. SEE CURRENT STANDARD DRAWING RDI-035 FOR COATINGS, LININGS AND PAVINGS FOR NON-STRUCTURAL PIPE.
9. SEE DETAIL SHEET "PIPE BEDDING FOR CULVERTS, ENTRANCE, AND STORM SEWER REINFORCED CONC. PIPE" AND DETAIL SHEET "PIPE BEDDING TRENCH CONDITION REINFORCED CONC. PIPE" FOR RCP COVER HEIGHT AND BEDDING REQUIREMENTS.

### LEGEND

- CSPHS: CORRUGATED STEEL PIPE WITH HELICAL LOCK SEAM OR HELICAL WELDED SEAM (HELIICAL CORR.)
- CSPLS: CORRUGATED STEEL PIPE WITH LONGITUDINAL RIVETED OR SPOT WELDED SEAM (ANNUULAR CORR.)
- CAPHS: CORRUGATED ALUMINUM ALLOY PIPE WITH HELICAL LOCK SEAM (HELIICAL CORR.)
- HDPE: HIGH DENSITY POLYETHYLENE PIPE
- PVC: POLYVINYL CHLORIDE
- SRS: SPIRAL RIB STEEL
- SRA: SPIRAL RIB ALUMINUM
- RCP: CIRCULAR REINFORCED CONCRETE PIPE

48" PIPE - 54" PIPE

KENTUCKY DEPARTMENT OF HIGHWAYS
CULVERT & STORM SEWER PIPE TYPES & COVER HEIGHTS

SHEET 3 OF 8

APPROVED: 04-25-08
EXP. JOINT REQUIRED WHEN ABUTTING ANOTHER RIGID STRUCTURE

A

1/2" EXPANSION JOINT MATL.

SIDEWALK

PAY LIMITS

UTILITY STRIP

"L"

PLAN VIEW

~ NOTES ~

FOR WIDTH W AND F:

RESIDENTIAL - MINIMUM W = 12'-0"; MAXIMUM W = 24'-0"; MINIMUM F = 2'-6"; MAXIMUM F = 10'-0"

COMMERCIAL - MINIMUM W = 24'-0"; MAXIMUM W = 36'-0"; F = 10'-0"

WHEN MORE THAN 2 LANES ARE REQUIRED, 36'-0" WIDTH MAY BE INCREASED TO RELIEVE INTERFERENCE BETWEEN ENTERING AND EXITING TRAFFIC. AT THE ENGINEER'S DISCRETION RADIAL RETURNS MAY BE USED ON ENTRANCES. SOME APPLICABLE CASES ARE THE FOLLOWING:

a. ON ENTRANCES EXPECTED TO CARRY HIGH VOLUMES OF TRAFFIC.

b. WHEN ENTRANCE WIDTH IS GREATER THAN 36'.

c. WHEN THE HIGHWAY HAS A POSTED OR OPERATING SPEED OVER 40 MPH.

d. ON A RURAL SECTION WHERE A FLUSH SHOULDER EXISTS.

e. WHERE AN EXCLUSIVE RIGHT TURN LANE IS USED.

1'-0" OR 2'-0" WITH CONCRETE PAVEMENT, 2'-0" WITH FLEXIBLE PAVEMENT

3. WHEN "L" DIMENSION IS GREATER THAN 15'-0" A SAWED AND SEALED JOINT, 1/4" DEEP AND 1/2" WIDE SHALL BE PLACED AT THE CENTER OF THE "L" DIMENSION. WIDE ENTRANCES REQUIRE ADDITIONAL JOINTS, SPACING SHALL NOT EXCEED 15'-0" O.C.

4. CLASS "A" CONCRETE OR JOINTED PLAIN CONCRETE PAVEMENT SHALL BE USED IN THE ENTRANCE PAVEMENT.

5. THE ENTRANCE PAVEMENT SHALL RECEIVE A BROOM FINISH AND SHALL BE CURED THE SAME AS THE MAINLINE PAVEMENT AND/OR SIDEWALK.

6. THE CONTRACT UNIT PRICE BID PER SQUARE YARD FOR "CONC. ENT. PAVEMENT-8 INCH (CODE NO. 210) SHALL INCLUDE CLASS "A" CONCRETE AND ALL INCIDENTALS NECESSARY TO COMPLETE THE WORK. D.G.A. AND DETECTABLE WARNINGS SHALL BE SEPARATE BID ITEMS.

7. USE CONDITION NO. 2 OR NO. 3 WHEN LITTLE OR NO UTILITY STRIP IS PROVIDED, AND INCORPORATE FEATURES OF OTHER DESIGNS SHOWN WHERE NOT IN CONFLICT.

8. PROVIDED THAT ADA GUIDELINES SHOWN IN NOTES 9 AND 10 ARE FOLLOWED, THE ENGINEER MAY MODIFY THE DESIGN TO BETTER FIT EXISTING CONDITIONS.

9. 2% CROSS SLOPE MAXIMUM ON SIDEWALK. IF CONDITIONS WARRANT, SIDEWALK MAY BE SLOPED 2% AWAY FROM ROADWAY.

10. SIDEWALKS SHOULD BE DESIGNED WITH A MAX. GRADE OF 5%. WHERE A SIDEWALK RUNS ALONG A STEEP ROADWAY, THE SIDEWALK GRADE MAY EXCEED 5% IF IT FOLLOWS THE GRADE OF THE ROADWAY.

II. COMMERCIAL DRIVEWAYS WITH TRAFFIC CONTROL DEVICES REQUIRE ADA SIDEWALK TREATMENTS WITH DETECTABLE WARNINGS.
FOR WIDTH W:

1. **Commercial:** Minimum W = 24'-0", Maximum W = 36'-0" when more than 2 lanes are required, 36'-0" width may be increased to relieve interference between entering and exiting traffic. At the engineer's discretion radial returns may be used on entrances. Some applicable cases are the following:
   a. On entrances expected to carry high volumes of traffic.
   b. When entrance width is greater than 36'.
   c. When the highway has a posted or operating speed over 40 MPH.
   d. On a rural section where a flush shoulder exists.
   e. Where an exclusive right turn lane is used.

2. 1'-0" or 2'-0" with concrete pavement, 2'-0" with flexible pavement.

3. When "L" dimension is greater than 15'-0", a sawed and sealed joint, 1/4" deep and 1/2" wide shall be placed at the center of the "L" dimension. Wide entrances require additional joints, spacing shall not exceed 15'-0" O.C.

4. Class "A" concrete or jointed plain concrete pavement shall be used in the entrance pavement.

5. The entrance pavement shall receive a broom finish and shall be cured the same as the mainline pavement and/or sidewalk.

6. The contract unit price bid per square yard for "Conc. Ent. Pavement - B inch (Code No. 2101)" shall include class "A" concrete and all incidentals necessary to complete the work. D.G.A. and detectable warnings shall be separate bid items.

7. Providing that ADA guidelines shown in Note 8 and 9 are followed, the engineer may modify the design to better fit existing conditions.

8. 2% cross slope maximum on sidewalk.

9. Sidewalks should be designed with a max. grade of five percent. Where a sidewalk runs along a steep roadway, the sidewalk grade may exceed five percent if it follows the grade of the roadway.

10. Commercial driveways with traffic control devices require ADA sidewalk treatments with detectable warnings.
NOTES

Ramps shall be paid per sq. yard of 4" conc. sidewalk and the unit price shall include all materials, forms, curb behind ramp and landing, and incidental necessary for construction.

The ramp shall be constructed of class "A" concrete. A broom finish or equal non-skid finish is required. Detectable warnings shall be a separate bid item.

The normal gutter line shall be maintained through the area of the ramp.

Ramps should be located within marked limits of crosswalks.

Use ramp type 1 when point A to B is less than 20 feet.

Use ramp type 2 when point A to B is 20 feet or more.

1. Curved ramp grade shall not exceed 12:1, cross slope shall not exceed 2%. On retrofit curb ramps, grades of 12.5% for 2'-0" or 10% for 5'-0" are permissible.

2. curb return required when utility strip is 4 feet or greater. For utility strips less than 4 feet, the area is to be surfaced with sidewalk within the ramp.

3. 1/2" expansion joint at back of curb line and at sidewalk line.

4. no bump permitted. same slope as ramp and not to exceed 1" in height. ramps shall be constructed so that water will not accumulate on walking surfaces.

5. all sidewalk ramps require detectable warnings.

6. landings will provide a level area (less than 2% grade or cross slope) at approximate street elevation. a 4 foot square level landing is the required minimum.
SQUARE PATTERN (PARALLEL ALIGNMENT)

SQUARE PATTERN (DIAGONAL ALIGNMENT)

TRIANGULAR PATTERN

NOTES

BID ITEM AND UNIT TO BID.

DETECTABLE WARNINGS - SQ. FT.

1. LANDINGS WILL PROVIDE A LEVEL AREA (LESS THAN 2% GRADE OR CROSS SLOPE) AT APPROXIMATE STREET ELEVATION. A 4 FOOT SQUARE LEVEL LANDING IS THE REQUIRED MINIMUM.

2. ALL SIDEWALK RAMPS REQUIRE DETECTABLE WARNINGS.

3. COMMERCIAL DRIVEWAYS WITH TRAFFIC CONTROL DEVICES REQUIRE ADA SIDEWALK TREATMENTS WITH DETECTABLE WARNINGS.

4. PAVERS SHALL BE CONCRETE WITH A MINIMUM THICKNESS OF 2".

5. PAVERS SHALL BE A COLOR HOMOGENOUS THROUGHOUT THE PAVER, THAT COLOR SHALL CONTRAST VISUALLY WITH THE ADJOINING SURFACES, EITHER LIGHT-ON-DARK OR DARK-ON-LIGHT. THE DEPARTMENT WILL ALLOW EITHER YELLOW OR RED AS COLORS.

6. PAVERS TO BE SET IN MORTAR.

7. DETECTABLE WARNING SURFACE BEGINS AT BACK OF CURB.

USE WITH CUR. STD. DWGS. RPM-160 AND RPM-170

DETECTABLE WARNINGS

KENTUCKY DEPARTMENT OF HIGHWAYS

Approve: 03-13-09
GENERAL NOTES

CROWN: Crown shall conform to the rate of crown at the approach pavement and bridge deck. If the rate of crown at the bridge deck differs from that of approach pavement, a smooth transition shall be provided within the limits of the approach slab.

CONCRETE: Concrete shall be Class "AA".

REINFORCEMENTS: All steel reinforcement shall be Grade 60 and epoxy coated. Payment: Include the cost of Class "AA" Concrete, epoxy-coated steel reinforcement, and all labor and materials required to construct the approach slab in the bid item for Approach Slab.
APPLICATION

THIS SEPIA DRAWING APPLIES TO CENTERLINE RUMBLE STRIPS ON TWO-LANE HIGHWAYS AND FOUR-LANE UNDIVIDED HIGHWAYS.

GENERAL NOTES

1. CENTERLINE RUMBLE STRIPS SHALL BE OMITTED THROUGH MAJOR INTERSECTIONS WITH OR WITHOUT LEFT-TURN LANES. RUMBLE STRIPS SHALL BE OMITTED IN THE AREA WHERE CENTERLINE PAVEMENT MARKINGS HAVE BEEN OMITTED (NORMALMELY WHERE SIDE STREET RADIUS INTERSECTS MAINLINE).

2. CENTERLINE RUMBLE STRIPS SHALL NOT BE INSTALLED ACROSS HIGHWAY-RAIL GRADE CROSSINGS.

3. CENTERLINE RUMBLE STRIPS SHALL NOT BE INSTALLED THROUGH MARKED CROSSWALKS.

4. CENTERLINE RUMBLE STRIPS SHALL NOT BE INSTALLED ON BRIDGE DECKS OR APPROACH SLABS.

5. CENTERLINE RUMBLE STRIPS SHALL BE INSTALLED THROUGH MINOR INTERSECTIONS/ENTRANCES.

6. WARNING SIGNS THAT WARN MOTORCYCLISTS OF THE PRESENCE OF CENTERLINE RUMBLE STRIPS SHALL BE INSTALLED IN ACCORDANCE WITH THE TRAFFIC OPERATIONS GUIDANCE MANUAL.
APPLICATION

This Sepia drawing applies to centerline rumble strips on two-lane highways and four-lane undivided highways with four-inch striping. Centerline rumble strips shall be placed on all super two highways. Rumble strips may also be placed on highways with a lane width of 12', a posted speed limit greater than 45 mph, and a pattern of collisions susceptible to correction by the installation of these devices.

GENERAL NOTES

1. Distances shown are approximate. Maintain rumble strip dimensions and spacing as much as possible.
2. Rumble strips shall be installed in line with the center of the roadway as much as possible.
3. Discontinue rumble strips at least 12" before and after the center of each raised pavement marker. Install as many rumble strips as possible between adjacent pavement markers while maintaining the 24" cycle.
4. Do not install centerline rumble strips in areas indicated on sepias 17 and 19.
5. Warning signs that warn motorists of the presence of centerline rumble strips shall be installed in accordance with the traffic operations guidance manual.
APPLICATION

THIS SEPIA DRAWING APPLIES TO CENTERLINE RUMBLE STRIPS ON TWO-LANE HIGHWAYS AND FOUR-LANE UNDIVIDED HIGHWAYS WITH SIX-INCH STRIPING. CENTERLINE RUMBLE STRIPS SHALL BE PLACED ON ALL SUPER TWO HIGHWAYS. RUMBLE STRIPS MAY ALSO BE PLACED ON HIGHWAYS WITH A LANE WIDTH OF 12', A POSTED SPEED LIMIT GREATER THAN 45 MPH, AND A PATTERN OF COLLISIONS SUSCEPTIBLE TO CORRECTION BY THE INSTALLATION OF THESE DEVICES.

GENERAL NOTES

1. DISTANCES SHOWN ARE APPROXIMATE. MAINTAIN RUMBLE STRIP DIMENSIONS AND SPACING AS MUCH AS POSSIBLE.
2. RUMBLE STRIPS SHALL BE INSTALLED IN LINE WITH THE CENTER OF THE ROADWAY AS MUCH AS POSSIBLE.
3. DISCONTINUE RUMBLE STRIPS AT LEAST 12" BEFORE AND AFTER THE CENTER OF EACH RAISED PAVEMENT MARKER, INSTALL AS MANY RUMBLE STRIPS AS POSSIBLE BETWEEN ADJACENT PAVEMENT MARKERS WHILE MAINTAINING THE 24" CYCLE.
4. DO NOT INSTALL CENTERLINE RUMBLE STRIPS IN AREAS INDICATED ON SEPIA DRAWING 17 AND 18.
5. WARNING SIGNS THAT WARN MOTORCYLISTS OF THE PRESENCE OF CENTERLINE RUMBLE STRIPS SHALL BE INSTALLED IN ACCORDANCE WITH THE TRAFFIC OPERATIONS GUIDANCE MANUAL.
1. BID ITEMS AND UNIT TO BID:
   A. GUARDRAIL END TREATMENT TYPE 4A - EACH
   B. MATERIAL USED TO CONSTRUCT WIDENING SHALL BE
      BID AS ROADWAY OR BORROW EXCAVATION OR
      EMBANKMENT-IN-PLACE AT THE CONTRACT UNIT PRICE
      PER CUBIC YARD.

2. INTENDED USE: AREAS WITH ADEQUATE VEHICLE RECOVERY ZONE BEHIND GUARDRAIL.

3. POST P7 SHALL BE A CRT BREAKAWAY WOOD POST.

4. GUARDRAIL END TREATMENT TYPE 4A IS A PATENTED (ONE SOURCE) PRODUCT MANUFACTURED
   BY TRINITY INDUSTRIES, INC. OF DALLAS, TX. OR ROAD SYSTEMS, INC. OF BIG SPRING, TX.

5. THE MANUFACTURER SHALL FURNISH TWO (2) SETS OF SHOP PLANS TO THE CONTRACTOR WITH
   EACH INSTALLATION.

6. SYSTEM OFFSET OF 4'-0" SHALL BE MEASURED FROM FACE OF OFFSET BLOCK AT
   NORMAL GUARDRAIL SECTION TO FACE OF POST AT P1.

7. OBJECT MARKER TYPE 3 (SEE CURRENT MUTCD MANUAL FOR DETAILS).
TURF MAT SLOPE INSTALLATION

NOTES

1. CONSTRUCT A 6" X 12" ANCHOR TRENCH AT THE BEGINNING OF THE SLOPE, LINE THE ANCHOR TRENCH WITH TURF REINFORCING MAT LEAVING 12" EXTENDING PAST THE ANCHOR TRENCH. FASTEN THE MAT MATERIAL INTO THE ANCHOR TRENCH ON 12" CENTERS BACKFILL THE TRENCH WITH TOPSOIL AND COMPACT. COVER THE AREA WITH THE REMAINING 12" OF THE MAT'S TERMINAL END LEAVING 6" TO OVERLAP THE TURF REINFORCING MAT. SECURE THE 6" OVERLAP WITH STAPLES ON 12" CENTERS.

2. UNROLL THE MAT PARALLEL TO THE PRIMARY DIRECTION OF WATER FLOW AND PLACE IN DIRECT CONTACT WITH THE SOIL SURFACE. DO NOT STRETCH OR ALLOW THE MATERIAL TO BRIDGE OVER SURFACE INCONSISTENCIES.

3. SECURELY FASTEN THE MAT TO THE SOIL BY INSTALLING STAPLES AT A MINIMUM RATE OF 1.5 PER SQ. YD. ANCHORS SHALL BE SELECTED SO THAT THEY HAVE SUFFICIENT GROUND PENETRATION TO RESIST PULLOUT. INCREASE ANCHORING FREQUENCY FOR SITE CONDITIONS (LOOSE, SANDY, OR WET SOILS) AS DIRECTED BY THE ENGINEER AND MANUFACTURER'S REPRESENTATIVE.

4. OVERLAP EDGES OF PARALLEL AND PERPENDICULAR BLANKETS ALONG THE SLOPE A MINIMUM OF 3" AND SECURE WITH STAPLES AT A MAXIMUM SPACING OF 1".

5. CONSTRUCT A 6" X 12" ANCHOR TRENCH AT THE TOE OF THE SLOPE FOLLOWING SIMILAR PROCEDURE DENOTED FOR THE TOP OF THE SLOPE ANCHOR TRENCH.

6. ENSURE THAT THE MAT IS IN DIRECT CONTACT WITH THE SOIL SURFACE WITH NO PROJECTIONS OR PROTRUSIONS.

7. APPLY SEEDING AND PROTECTION ACCORDING TO SECTION 212.03.03 USING SEED MIX TYPE 1, DIRECTLY AFTER APPLYING SEEDING AND TREATMENTS IN 212.03.03. BUT BEFORE APPLYING MULCHING OR HYDROMULCHING: INFILL THE VOID SPACES IN THE MAT WITH 1/2" OF TOPSOIL, TOPSOIL IS THE SOIL PROFILE DEFINED TECHNICALLY AS "A" HORIZON BY THE SOIL SCIENCE SOCIETY OF AMERICA. USE LOOSE, FRIABLE TOPSOIL THAT IS FREE OF STONES 1" OR GREATER IN OVERALL DIMENSIONS. ADMIXTURE OF SUBSOIL, REFUSE, STUMPS, ROOTS, BRUSH, WEEDS AND OTHER MATERIALS THAT PREVENT THE FORMATION OF A SUITABLE SEED BED. DO NOT USE TOPSOIL FROM SITES HAVING JOHNSON GRASS, CANADA THISTLE, QUACK GRASS, NODDING THISTLE OR EXCESSIVE AMOUNTS OF WEEDS OR THEIR RHIZOMES.
NOTES

1. Construct a 6" x 12" anchor trench at the beginning of the channel. Line the anchor trench with turf reinforcing mat leaving 12" extending past the anchor trench. Fasten the mat material into the anchor trench on 12" centers. Backfill the trench with topsoil and compact, cover the area with the remaining 12" of the mat's terminal end leaving 6" to overlap the turf reinforcing mat, secure the 6" overlap with staples on 12" centers.

2. Unroll the mat parallel to the primary direction of water flow and place in direct contact with the soil surface. Do not stretch or allow the material to bridge over surface inconsistencies.

3. Excavate 6" x 6" check slots every 25' along the length of the channel. Line the side and bottom of the slot with the mat and then pull back over, fasten with staples on 12" centers. Fill the check slot with topsoil, compact, and continue unrolling the mat down the channel.

4. Continue unrolling the mat downstream over the compacted slot to next check slot or terminal anchor trench. If more than one section of mat is used, overlap upstream mats over top of the downstream mat 3" and secure staples on 12" centers.

5. Secure Mats while unrolling on sideslopes and channel bottoms with staples at a frequency the table indicates. Use staples having sufficient ground penetration to resist pullout. Increase anchoring frequency as directed by the engineer and manufacturer's representative.

6. Apply seeding and protection according to section 212.03.03 using seed mix type I, directly after applying seeding and treatments in 212.03.03, but before applying mulching or hydromulching; infill the void spaces in the mat with 1/2" of topsoil. Topsoil is the soil profile defined technically as "A" horizon by the Soil Science Society of America, use loose, friable topsoil that is free of stones 1" or greater in overall dimensions, admixture of subsoil, refuse, stumps, roots, brush, weeds and other materials that prevent the formation of a suitable seed bed. Do not use topsoil from sites having Johnson grass, Canada thistle, quack grass, noding thistle or excessive amounts of weeds or their rhizomes.

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<td>1.5 ANCHORS/SQUARE YARD</td>
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<td>2H:1V TO 1H:1V</td>
<td>2.0 ANCHORS/SQUARE YARD</td>
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<tr>
<td>STEEPER THAN 1H:1V</td>
<td>3.0 ANCHORS/SQUARE YARD</td>
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KENTUCKY
DEPARTMENT OF HIGHWAYS
TURF MAT
CHANNEL INSTALLATION

05-20-09
022