## PART 3

**STORM DRAINS**

### Abbreviations and Symbols

<table>
<thead>
<tr>
<th>Plan</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>301</td>
<td>Abbreviations and symbols for storm drains</td>
<td>113</td>
</tr>
</tbody>
</table>

### Catch Basins, Inlets, Outlets and Hardware

<table>
<thead>
<tr>
<th>Plan</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>302</td>
<td>30&quot; Frame and cover</td>
<td>115</td>
</tr>
<tr>
<td>303</td>
<td>44&quot; Frame and cover</td>
<td>119</td>
</tr>
<tr>
<td>304</td>
<td>48&quot; Cover and frame</td>
<td>121</td>
</tr>
<tr>
<td>305</td>
<td>51&quot; Cover and frame</td>
<td>123</td>
</tr>
<tr>
<td>308</td>
<td>35 1/2&quot; Grate and frame with adjustable curb box</td>
<td>129</td>
</tr>
<tr>
<td>309</td>
<td>47 3/4&quot; Grate and frame</td>
<td>131</td>
</tr>
<tr>
<td>310</td>
<td>48&quot; Grate and frame</td>
<td>135</td>
</tr>
<tr>
<td>315</td>
<td>Catch basin</td>
<td>137</td>
</tr>
<tr>
<td>316</td>
<td>Combination inlet/cleanout box</td>
<td>141</td>
</tr>
<tr>
<td>317</td>
<td>Curb inlet/outlet</td>
<td>143</td>
</tr>
<tr>
<td>320</td>
<td>Debris grate inlet</td>
<td>147</td>
</tr>
<tr>
<td>321</td>
<td>Automatic flap gate (pressurized storm drains)</td>
<td>149</td>
</tr>
<tr>
<td>322</td>
<td>Curb outlet</td>
<td>151</td>
</tr>
<tr>
<td>323</td>
<td>Pipe outfall access control rack</td>
<td>153</td>
</tr>
</tbody>
</table>

### Cleanout Box and Hardware

<table>
<thead>
<tr>
<th>Plan</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>330</td>
<td>Cleanout box</td>
<td>155</td>
</tr>
<tr>
<td>331</td>
<td>Cleanout box</td>
<td>157</td>
</tr>
<tr>
<td>332</td>
<td>Cast in-place manhole</td>
<td>159</td>
</tr>
<tr>
<td>335</td>
<td>Adjust reinforced concrete deck to grade</td>
<td>161</td>
</tr>
</tbody>
</table>

### Manhole and Hardware

<table>
<thead>
<tr>
<th>Plan</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>341</td>
<td>Precast manhole</td>
<td>163</td>
</tr>
<tr>
<td>345</td>
<td>Concrete deck</td>
<td>167</td>
</tr>
<tr>
<td>360</td>
<td>Raise frame to grade – plastic form</td>
<td>169</td>
</tr>
<tr>
<td>361</td>
<td>Raise frame to grade – grade ring</td>
<td>171</td>
</tr>
<tr>
<td>362</td>
<td>Cover collar for storm drains</td>
<td>173</td>
</tr>
</tbody>
</table>

### Piping

<table>
<thead>
<tr>
<th>Plan</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>372</td>
<td>Area drain</td>
<td>175</td>
</tr>
<tr>
<td>373</td>
<td>Concrete pier</td>
<td>177</td>
</tr>
</tbody>
</table>

### Trenching

<table>
<thead>
<tr>
<th>Plan</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>381</td>
<td>Trench Backfill</td>
<td>179</td>
</tr>
<tr>
<td>382</td>
<td>Pipe zone backfill</td>
<td>181</td>
</tr>
</tbody>
</table>

---

*Plan 382 Replaced with Pipe Laying Flow Chart and Drawing*
Abbreviations and symbols for storm drains

1. LETTERING SIZE: 100 Leroy minimum except for line type and other background information. Use 120 Leroy for new work installation.

2. LETTERING STYLE: Capital letters preferred.

3. EXISTING IMPROVEMENTS: Shown in light shaded dashed line.

4. NEW IMPROVEMENTS: Shown in solid continuous line.
Abbreviations and symbols for storm drains
1. CASTINGS: Grey iron class 35 minimum per ASTM A 48.

2. COATINGS: Except machined surfaces, coat all metal parts with asphaltum paint.

3. INSCRIPTIONS: Cast the words "STORM DRAIN" on the cover flush with the surface finish.

4. HEAT NUMBER: Place foundry and heat number on the inside of the frame and on the bottom of the cover.

5. FIT: ✓ designates machined surface. Give the frame and cover a machine finish so the cover will not rock.

6. LOCKING: Provide covers for manholes located in easements, rights-of-way, alleys, parking lots, and all other places except paved streets, with allen socket set screw locking devices. Drill and tap two holes to a depth of 1 inch at 90 degrees to pry hole and install 3/4 x 3/4 inch allen socket set screws.


8. MANHOLE STRUCTURES: See Plan No. 341.
SECTION A–A

30" Frame and cover
30" Frame and cover – type B

1. CASTINGS: Grey iron class 35 minimum per ASTM A 48.

2. COATINGS: Except machined surfaces, coat all metal parts with asphaltum paint.

3. INSCRIPTIONS: Cast the words "STORM DRAIN" on the cover flush with the surface finish.

4. HEAT NUMBER: Place foundry and heat number on the inside of the frame and on the bottom of the cover.

5. FIT: ✓ designates machined surface. Give the frame and cover a machine finish so the cover will not rock.

6. LOCKING: Provide covers for manholes located in easements, rights-of-way, alleys, parking lots, and all other places except paved streets, with allen socket set screw locking devices. Drill and tap two holes to a depth of 1 inch at 90 degrees to pry hole and install 3/4 x 3/4 inch allen socket set screws.


8. MANHOLE STRUCTURES: See Plan No. 341.
TYPE B

STORM DRAIN

PRY HOLE

SECTION A-A

30" Frame and cover

24 3/4"

21 1/4"

26 1/4"

25"

32"

24 5/8"

25"

30" NOMINAL

36"

5.00°

ASSEMBLED HEIGHT ADJUSTABLE

8 1/4" MINIMUM

Plan No.

302

Drawing 2 of 2

September 2001

117
44" Frame and cover

1. CASTINGS: Grey iron class 35 minimum per ASTM A 48.

2. COATINGS: Except machined surfaces, coat all metal parts with asphaltum paint.

3. INSCRIPTIONS: Cast the words "STORM DRAIN" on the cover flush with the surface finish.

4. HEAT NUMBER: Place foundry and heat number on the inside of the frame and on the bottom of the cover.

5. FIT: √ designates machined surface. Give the frame and cover a machine finish so the cover will not rock.

6. LOCKING: Provide covers for manholes located in easements, rights-of-way, alleys, parking lots, and all other places except paved streets, with allen socket set screw locking devices. Drill and tap two holes to a depth of 1 inch at 90 degrees to pry hole and install 3/4 x 3/4 inch allen socket set screws.


8. MANHOLE STRUCTURES: See Plan No. 341.
44" Frame and cover
**48” Cover and frame**

1. **CASTINGS:** Grey iron class 35 minimum per ASTM A 48.

2. **COATINGS:** Except machined surfaces, coat all metal parts with asphaltum paint.

3. **CONCRETE BOX:** See Plan No. 331.

4. **HEAT NUMBER:** Place foundry and heat number on the inside of the frame and on the bottom of the cover.
48" Cover and frame

Plan No.

304
1. CASTINGS: Grey iron class 35 minimum per ASTM A 48.

2. COATINGS: Except machined surfaces, coat all metal parts with asphaltum paint.

3. PRE-DRILL: Drill and tap covers at factory to match frames. Keep covers and frames bolted together prior to and during installation.

4. ACCESSORIES: Stainless steel bolts, washers, and accessories required. See APWA Section 05 05 23.

5. CONCRETE BOX: See Plan No. 332.

6. HEAT NUMBER: Place foundry and heat number on the inside of the frame and on the bottom of the cover.
NARRATIVE

USE THIS FRAME AND COVER IN ROADWAYS AND OTHER AREAS SUBJECT TO HEAVY LOADINGS

THIS COVER FITS TYPE A, B, C, AND D FRAMES

COVER PLAN VIEW

SECTION A-A

DETAIL 1

SECTION B-B

51" Cover and frame - cover
**51” Cover and frame - type A frame**

1. **NARRATIVE:** Use this frame and cover in roadways and other areas subject to heavy loadings. This cover fits Type A, B, C and D frames.

2. **FRAME:** ASTM A 36 steel, or ASTM A 48 grey iron class 35 minimum.

3. **COATINGS:** Except machined surfaces, coat all metal parts with asphaltum paint.

4. **PRE-DRILL:** Drill and tap covers at factory to match frames. Keep covers and frames bolted together prior to and during installation.

5. **CONCRETE BOX:** See Plan No. 332.
PLAN — TYPE A FRAME

SECTION A-A

SECTION C-C

SECTION B-B

51" Cover and frame - type A frame

Plan No. 305

April 1997

Drawing 2 of 3
51" Cover and frame - type `B', `C', or `D' frame

1. FRAME: ASTM A 36 steel, or ASTM A 48 grey iron class 35 minimum.

2. COATINGS: Except machined surfaces, coat all metal parts with asphaltum paint.

3. PRE-DRILL: Drill and tap covers at factory to match frames. Keep covers and frames bolted together prior to and during installation.

4. CONCRETE BOX: See Plan No. 332.
PLAN – TYPE B, C, AND D FRAMES

SECTION VIEWS
TYPES B, C & D

SECTION B-B

SECTION C-C

51" Cover and frame - type 'B', 'C', or 'D' frame
35 1/2" Grate and frame with adjustable curb box

1. CASTING: Grey iron class 35 minimum per ASTM A 48.
2. COATINGS: Except machined surfaces, coat all metal parts with asphaltum paint.
3. INLET BOX: See Plan No. 315.
35 1/2" Grate and frame with adjustable curb box
47 3/4" Grate and frame

1. CASTING: Grey iron class 35 minimum per ASTM A 48.
2. COATINGS: Except machined surfaces, coat all metal parts with asphaltum paint.
3. INLET BOX: See Plan No. 331.
VANE GRATE

**FRAME**

**GRATE**

**SECTION A-A**

**SECTION C-C**

**SECTION B-B**

**SECTION D-D**

**DETAIL 1**

*47 3/4" Grate and frame*


47 3/4" Grate and frame

1. CASTING: Grey iron class 35 minimum per ASTM A 48.
2. COATINGS: Except machined surfaces, coat all metal parts with asphaltum paint.
3. INLET BOX: See Plan No. 331.
GRID GRATE

FRAME

GRATE

SECTION A-A

SECTION C-C

SECTION B-B

SECTION D-D

DETAIL 1

47 3/4" Grate and frame
48" Grate and frame

1. CAST IRON FRAMES: Grey iron class 35 minimum per ASTM A 48. Cast frame and lugs as one solid, complete unit.

2. STEEL FRAMES: Studs may be welded to the frame. Use ASTM A 36 steel.

3. COATINGS: Except machined surfaces, coat all metal parts with asphaltum paint.

4. INLET BOX: See Plan No. 331.
**GRATE**

**SECTION A–A**

**FRAME**

**SECTION B–B**

*48" Grate and frame*
**Catch basin**

1. **UNTREATED BASE COURSE:** Provide material specified in APWA Section 32 11 23.
   A. Do not use gravel as a substitute for untreated base course without ENGINEER’s permission.
   B. Place material per APWA Section 31 23 23.
   C. Compact per APWA Section 31 23 26 to a modified proctor density of 95 percent or greater. Maximum lift thickness before compaction is 8 inches when using riding compaction equipment or 6 inches when using hand held compaction equipment.

2. **BACKFILL:** Provide and place per APWA Section 31 23 23 on all sides of basin.
   Compact per APWA Section 31 23 26 to a modified proctor density of 95 percent or greater. Maximum lift thickness is 8 inches before compaction.

3. **REINFORCEMENT:** ASTM A 615, grade 60, deformed steel.

4. **CONCRETE:** Class 4000 per APWA Section 03 30 04. Place concrete per APWA Section 03 30 10 Cure per APWA Section 03 39 00.

5. **PIPE LATERALS:** The drawing shows alternate connections to the catch basin. Refer to construction drawings for connection locations.

6. **CURB FACE OPENING:** Make opening at least 4 inches high. Provide at least a 2 inch drop between the “begin warp” line in the gutter flow-line and the top of the grate at the curb face opening.
TYPE A - CURB INLET WITH SINGLE GRATE

SECTION A-A

SECTION B-B

SECTION C-C

Catch basin
Catch basin

1. UNTREATED BASE COURSE: Provide material specified in APWA Section 32 11 23.
   A. Do not use gravel as a substitute for untreated base course without ENGINEER’s permission.
   B. Place material per APWA Section 31 23 23.
   C. Compact per APWA Section 31 23 26 to a modified proctor density of 95 percent or greater. Maximum lift thickness before compaction is 8 inches when using riding compaction equipment or 6 inches when using hand held compaction equipment.

2. BACKFILL: Provide and place per APWA Section 31 23 23 on all sides of basin. Compact per APWA Section 31 23 26 to a modified proctor density of 95 percent or greater. Maximum lift thickness is 8 inches before compaction.

3. REINFORCEMENT: ASTM A 615, grade 60, deformed steel.

4. CONCRETE: Class 4000 per APWA Section 03 30 04. Place concrete per APWA Section 03 30 10. Cure per APWA Section 03 39 00.

5. PIPE LATERALS: The drawing shows alternate connections to the catch basin. Refer to construction drawings for connection locations.

6. CURB FACE OPENING: Make opening at least 4 inches high. Provide at least a 2 inch drop between the “begin warp” line in the gutter flow-line and the top of the grate at the curb face opening.
TYPE B - CURB INLET WITH DOUBLE GRATE

SECTION A-A

SECTION B-B

SECTION C-C

Catch basin
Combination inlet / cleanout box

1. UNTREATED BASE COURSE: Provide material specified in APWA Section 32 11 23.
   A. Do not use gravel as a substitute for untreated base course without ENGINEER’s permission.
   B. Place material per APWA Section 31 23 23.
   C. Compact per APWA Section 31 23 26 to a modified proctor density of 95 percent or greater. Maximum lift thickness before compaction is 8 inches when using riding compaction equipment or 6 inches when using hand held compaction equipment.

2. BACKFILL: Provide and place per APWA Section 31 23 23 on all sides of basin. Compact per APWA Section 31 23 26 to a modified proctor density of 95 percent or greater. Maximum lift thickness is 8 inches before compaction.

3. REINFORCEMENT: ASTM A 615, grade 60, deformed steel. See APWA Section 03 20 00 requirements.

4. CONCRETE: Class 4000 per APWA Section 03 30 04. Place concrete per APWA Section 03 30 10. Cure per APWA Section 03 39 00.

5. PIPE LATERALS: The drawing shows alternate connections to the catch basin. Refer to construction drawings for connection locations.

6. LADDER RUNGS: Provide plastic coated steel ladder rungs in boxes over 6 feet deep. Place bottom rung 6 inches above top of pipe.

7. CURB FACE OPENING: Make opening at least 4 inches high. Provide at least a 2 inch drop from the concrete gutter flow-line to the top of the grate at the curb face opening.
PLAN

RAISE FRAME TO GRADE (PLAN No. 360 OR 361)

FRAME AND COVER (PLAN No. 302)

CONCRETE COLLAR (PLAN No. 362)

4" CURB OPENING (NOTE 7)

FRAME AND GRATE (PLAN No. 308)

#4 @ 6" O.C. EACH WAY (NOTE 3)

MATCH FACE WITH TOP BACK OF CURB ALIGNMENT

PIECE LATERALS (NOTE 5)

CONCRETE (NOTE 4)

BACKFILL (NOTE 2)

#4 @ 12" O.C. EACH WAY (NOTE 3)

UNTREATED BASE COURSE (NOTE 1)

SECTION A-A

Combination inlet/cleanout box

August 2001

Plan No.

316
Curb inlet / outlet

1. UNTREATED BASE COURSE: Provide material specified in APWA Section 32 11 23.
   A. Do not use gravel as a substitute for untreated base course without ENGINEER's permission.
   B. Place material per APWA Section 31 23 23.
   C. Compact per APWA Section 31 23 26 to a modified proctor density of 95 percent or greater. Maximum lift thickness before compaction is 8 inches when using riding compaction equipment or 6 inches when using hand held compaction equipment.

2. BACKFILL: Provide and place per APWA Section 31 23 23 on all sides of basin. Compact per APWA Section 31 23 26 to a modified proctor density of 95 percent or greater. Maximum lift thickness is 8 inches before compaction.

3. REINFORCEMENT: ASTM A 615, grade 60, deformed steel. See APWA Section 03 20 00 requirements.

4. CONCRETE: Class 4000 per APWA Section 03 30 04. Place concrete per APWA Section 03 30 10. Cure per APWA Section 03 39 00.

5. PIPE LATERALS: The drawing shows alternate connections to the catch basin. Refer to construction drawings for connection locations.

6. FRAME AND COVER: Grey iron class 30 minimum per ASTM A 48. Coat all metal parts with asphaltum paint.

7. LADDER RUNGS: Provide plastic coated steel ladder rungs in boxes over 4 feet deep.
   A. If V = 3 feet or less, place one step above the floor of the basin.
   B. If V = 3 feet or more, place steps at 12 inch intervals from the floor of the basin with the top step at least 12 inches below the top of the manhole.

8. INSTALLATION:
   A. Locate connector pipe at the downstream end of the basin unless specifically noted otherwise on the construction drawings. Trim pipe to the final shape and length before placement of concrete.
   B. Make smooth curves at sill and sidewall at the gutter opening. Provide all exposed edges and corners with 1/2 inch radius edge finish. Match grade, slope, color and finish of adjacent curb and walkways.
   C. Make curb opening at least 4 inches high. Provide at least a 2 inch drop from the concrete gutter flow-line to the top of the grate at the curb face opening.
Dowel Detail

#3 Bar, 4 Req'd

Plan

For Face Plate (See Drawing 2)

Frame and Cover (Plan No. 304)

2" Clear

Section A-A

Curb inlet / outlet

Table of Dimensions

1. = 6" if V = 4'-0" or less
2. = 8" if V = 4'-1" to 8'-0"
3. = 10" if V = 8'-1" or more

Plan No.

317

August 2001

143

Drawing 1 of 2
Curb inlet / outlet

1. STEEL: ASTM A 36 hot dip galvanize after fabrication.
FACE PLATE DETAIL

Curb inlet / outlet

April 1997

Plan No.

317

Drawing 2 of 2
Debris grate inlet

1. BOLTS: Use 1/2 inch stainless steel bolts and 1/8 inch stainless steel washers.
2. STEEL: ASTM A 36 steel.
3. JOINTS: All joints to be welded.
4. COATING: Coat all metal parts with asphaltum paint.
CONCRETE HEADWALL

STEEL PLATE 3/16" THICK 2" WIDE

12"

BOLTS (NOTE 1)

5/8"D BARS OR #5 REBAR

2" (TYP)

3" (TYP)

2 d

DEBRIS GRATE INLET

RIGHT SIDE VIEW

Plan No.

320

April 1997

147
Automatic flap gate (pressurized storm drains)

1. BACKFILL: Provide and place per APWA Section 31 23 23. Compact per APWA Section 31 23 26 to a modified proctor density of 95 percent or greater. Maximum lift thickness is 8 inches before compaction.

2. REINFORCEMENT: ASTM A 615, grade 60, deformed steel. See APWA Section 03 20 00 requirements.

3. CONCRETE: Class 4000 per APWA Section 03 30 04. Place concrete per APWA Section 03 30 10. Cure per APWA Section 03 39 00.

4. INSTALLATION:
   A. Mount the automatic flap gate on a concrete collar poured in the end of a junction spur.
   B. Use nickel copper alloy mounting bolts and embed bolts 5 inches into the collar.
   C. Provide flap gate designed for 20 feet of seating head unless specified otherwise in the Contract Documents.
   D. The `Y` dimension is measured at the top of the junction structure spur for trapezoidal reinforced concrete channel.
   E. Flap gate may be either spigot back or flat back unless specified in the Contract Documents.
R.C.P. JUNCTION STRUCTURE SPUR CAST IN WALL OF STORM DRAIN

CENTER OF ENTRANCE TO CLEANOUT STRUCTURE

TABLE OF DIMENSIONS

<table>
<thead>
<tr>
<th>D (in.)</th>
<th>B (in.)</th>
<th>Z (in.)</th>
<th>Y (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>16</td>
<td>5.0</td>
<td>2.0</td>
</tr>
<tr>
<td>6</td>
<td>18</td>
<td>5.0</td>
<td>2.0</td>
</tr>
<tr>
<td>8</td>
<td>20</td>
<td>5.0</td>
<td>3.0</td>
</tr>
<tr>
<td>10</td>
<td>22</td>
<td>5.0</td>
<td>3.0</td>
</tr>
<tr>
<td>12</td>
<td>24</td>
<td>5.0</td>
<td>4.0</td>
</tr>
<tr>
<td>15</td>
<td>27</td>
<td>5.0</td>
<td>4.0</td>
</tr>
<tr>
<td>18</td>
<td>33</td>
<td>5.0</td>
<td>4.0</td>
</tr>
<tr>
<td>21</td>
<td>39</td>
<td>5.0</td>
<td>4.0</td>
</tr>
<tr>
<td>24</td>
<td>42</td>
<td>5.0</td>
<td>4.0</td>
</tr>
<tr>
<td>30</td>
<td>51</td>
<td>6.0</td>
<td>4.5</td>
</tr>
<tr>
<td>36</td>
<td>60</td>
<td>6.0</td>
<td>5.0</td>
</tr>
<tr>
<td>42</td>
<td>72</td>
<td>7.0</td>
<td>6.0</td>
</tr>
<tr>
<td>48</td>
<td>81</td>
<td>7.0</td>
<td>6.5</td>
</tr>
<tr>
<td>54</td>
<td>87</td>
<td>7.0</td>
<td>7.0</td>
</tr>
<tr>
<td>60</td>
<td>96</td>
<td>8.0</td>
<td>8.0</td>
</tr>
<tr>
<td>66</td>
<td>108</td>
<td>8.0</td>
<td>8.5</td>
</tr>
<tr>
<td>72</td>
<td>114</td>
<td>8.0</td>
<td>9.0</td>
</tr>
<tr>
<td>78</td>
<td>126</td>
<td>9.0</td>
<td>9.5</td>
</tr>
<tr>
<td>84</td>
<td>138</td>
<td>9.0</td>
<td>10.5</td>
</tr>
<tr>
<td>90</td>
<td>144</td>
<td>9.0</td>
<td>11.0</td>
</tr>
</tbody>
</table>

SECTION A–A

Automatic flap gate (pressurized storm drains)
Curb outlet

1. UNTREATED BASE COURSE: Provide material specified in APWA Section 32 11 23.
   A. Do not use gravel as a substitute for untreated base course without ENGINEER’s permission.
   B. Place material per APWA Section 31 23 23.
   C. Compact per APWA Section 31 23 26 to a modified proctor density of 95 percent or greater. Maximum lift thickness before compaction is 8 inches when using riding compaction equipment or 6 inches when using hand held compaction equipment.

2. BACKFILL: Provide and place per APWA Section 31 23 23 on all sides of basin. Compact per APWA Section 31 23 26 to a modified proctor density of 95 percent or greater. Maximum lift thickness is 8 inches before compaction.

3. REINFORCEMENT: ASTM A 615, grade 60, deformed steel. See APWA Section 03 20 00 requirements. Center steel in walls and slabs with a minimum cover of 2 inches. Keep steel 2 inches clear around pipe and lid opening.

4. CONCRETE: Class 4000 per APWA Section 03 30 04. Place concrete per APWA Section 03 30 10. Cure per APWA Section 03 39 00.

5. PIPE LATERALS: The drawing shows alternate connections to the curb outlet. Refer to construction drawings for connection locations or refer to field location of existing piping when engineering connection to existing piping.
Curb outlet

Frame and Cover (Plan No. 304)

Section A-A

Section B-B

Plan No. 322
Pipe outfall access control rack

1. UNTREATED BASE COURSE: Provide material specified in APWA Section 32 11 23.
   A. Do not use gravel as a substitute for untreated base course without ENGINEER’s permission.
   B. Place material per APWA Section 31 23 23.
   C. Compact per APWA Section 31 23 26 to a modified proctor density of 95 percent or greater. Maximum lift thickness before compaction is 8 inches when using riding compaction equipment or 6 inches when using hand held compaction equipment.

2. BACKFILL: Provide and place per APWA Section 31 23 23. Compact per APWA Section 31 23 26 to a modified proctor density of 95 percent or greater. Maximum lift thickness is 8 inches before compaction.

3. REINFORCEMENT: ASTM A 615, grade 60, deformed steel. See APWA Section 03 20 00 requirements. Weld rack with reinforcing steel or round bars of equal.

4. CONCRETE: Class 4000 per APWA Section 03 30 04. Place concrete per APWA Section 03 30 10. Cure per APWA Section 03 39 00.

5. STEEL: ASTM A 36.

6. INSTALLATION: Provide room to lay rack flat downstream.
   A. Fasten latch bracket to headwall with 1/2” x 6” stainless steel bolts and hex nuts or 1/2” stainless steel expansion bolts.
   B. When rack is in the closed position, the bottom rack bar must be tight against the top of the hinge bracket so that the rack cannot be lifted off of the latch.
   C. Fabricate hinge bracket from #4 rebar.
TRASH RACK LATCH LINKAGE, SEE TABLE OF DIMENSIONS FOR SIZE OF SQUARE TUBING STOCK FOR FABRICATION

RACK LATCH SEE DETAIL

PIPE SIZE + 3'-0"

#4 BARS (TYP) EACH FACE

RACK BAR SIZE SEE TABLE BELOW

HINGE BRACKET

7 1/2"

8"

6"

Hinge Bracket: Note 4

CONCRETE (NOTE 4)

FASTEN LATCH LINKAGE TO ANCHOR WITH CHAIN AND PADLOCK

ANCHOR-1 1/2" DIA.

STEEL BENT TO 3" DIA. & EMBEDDED 12" IN HEADWALL

UNTREATED BASE COURSE (NOTES 1 AND 2)

SECTION A-A

LEFT LATCH DETAIL (TYPICAL)

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>RACK BAR SIZE</th>
<th>LATCH PLATE THICKNESS</th>
<th>LATCH LINKAGE SIZE</th>
<th>PIPE SIZE</th>
<th>RACK BAR SIZE</th>
<th>LATCH PLATE THICKNESS</th>
<th>LATCH LINKAGE SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>18&quot;</td>
<td>#4</td>
<td>1/4&quot;</td>
<td></td>
<td></td>
<td>42&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>48&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24&quot;</td>
<td>#5</td>
<td></td>
<td></td>
<td></td>
<td>54&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27&quot;</td>
<td></td>
<td>3/8&quot;</td>
<td></td>
<td></td>
<td>60&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30&quot;</td>
<td>#6</td>
<td></td>
<td></td>
<td></td>
<td>66&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>33&quot;</td>
<td></td>
<td></td>
<td>1&quot;, .133&quot; THICK</td>
<td></td>
<td>72&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>36&quot;</td>
<td>#7</td>
<td></td>
<td></td>
<td></td>
<td>84&quot;</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Pipe outfall access control rack

Plan No. 323

April 1997
Cleanout box

1. **UNTREATED BASE COURSE**: Provide material specified in APWA Section 32 11 23.
   A. Do not use gravel as a substitute for untreated base course without ENGINEER’s permission.
   B. Place material per APWA Section 31 23 23.
   C. Compact per APWA Section 31 23 26 to a modified proctor density of 95 percent or greater. Maximum lift thickness before compaction is 8 inches when using riding compaction equipment or 6 inches when using hand held compaction equipment.

2. **BACKFILL**: Provide and place per APWA Section 31 23 23. Compact per APWA Section 31 23 26 to a modified proctor density of 95 percent or greater. Maximum lift thickness is 8 inches before compaction.

3. **REINFORCEMENT**: ASTM A 615, grade 60, deformed steel. See APWA Section 03 20 00 requirements. Center steel in walls and slabs with a minimum cover of 2 inches. Keep steel 2 inches clear around pipe and lid opening. A1 bars required at all corners, vertical and horizontal. A1 bars connecting two walls must match wall bar size and spacing. A1 bars connecting walls to top and bottom slabs must match slab steel size and spacing.

4. **CONCRETE**: Class 4000 per APWA Section 03 30 04. Place concrete per APWA Section 03 30 10. Cure per APWA Section 03 39 00.

5. **PIPE LATERALS**: Refer to Drawings for connection locations.

6. **ACCESS**: Eccentric access is shown. Prior to construction, verify if concentric access is required. Adjust reinforcement accordingly.

7. **LADDER RUNGS**: Plastic. Required in boxes greater than 6 feet deep with eccentric access. Align rungs with location of access opening. Rungs not required in boxes with concentric access.

8. **WALL THICKNESS AND WALL STEEL**

<table>
<thead>
<tr>
<th></th>
<th>Low Water Table</th>
<th>Modifications for High Water Table</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. Box Width</td>
<td>6 feet</td>
<td>8 feet</td>
</tr>
<tr>
<td>Max. Box Depth</td>
<td>6 feet</td>
<td>8 feet</td>
</tr>
<tr>
<td>Wall Thickness</td>
<td>8 inches</td>
<td>8 inches</td>
</tr>
<tr>
<td>Wall Curtain Steel</td>
<td>#5 @ 12”</td>
<td>#5 @ 6”</td>
</tr>
<tr>
<td></td>
<td>#5 @ 6”</td>
<td>#7 @ 9”</td>
</tr>
<tr>
<td>Wall Thickness</td>
<td>12 inches</td>
<td>12 inches</td>
</tr>
<tr>
<td>Wall Curtain Steel</td>
<td>#5 @ 6”</td>
<td>#6 @ 6”</td>
</tr>
</tbody>
</table>
**Cleanout box**

1. **UNTREATED BASE COURSE:** Provide material specified in APWA Section 32 11 23.
   A. Do not use gravel as a substitute for untreated base course without ENGINEER’s permission.
   B. Place material per APWA Section 31 23 23.
   C. Compact per APWA Section 31 23 26 to a modified proctor density of 95 percent or greater. Maximum lift thickness before compaction is 8 inches when using riding compaction equipment or 6 inches when using hand held compaction equipment.

2. **BACKFILL:** Provide and place per APWA Section 31 23 23. Compact per APWA Section 31 23 26 to a modified proctor density of 95 percent or greater. Maximum lift thickness is 8 inches before compaction.

3. **REINFORCEMENT:** ASTM A 615, grade 60, deformed steel. See APWA Section 03 20 00 requirements.

4. **CONCRETE:** Class 4000 per APWA Section 03 30 04. Place concrete per APWA Section 03 30 10. Cure per APWA Section 03 39 00.

5. **PIPE LATERALS:** The drawing shows alternate connections to the curb outlet. Refer to Construction Drawings for connection locations.

6. **COVER AND FRAME:** See Plan No. 304. Adjust concrete dimensions at frame accordingly.

7. **GRATE AND FRAME:** See Plan No. 309 or 310. Adjust concrete dimensions at frame accordingly.
NARRATIVE

THIS CONCRETE BOX MAY BE USED AS A CLEANOUT BOX OR AN INLET BOX. INSTALL THE APPROPRIATE FRAME AND COVER, OR FRAME AND GRATE.

PLAN VIEW

SECTION A-A

SECTION B-B

Cleanout box
1. **UNTREATED BASE COURSE:** Provide material specified in APWA Section 32 11 23.
   A. Do not use gravel as a substitute for untreated base course without ENGINEER’s permission.
   B. Place material per APWA Section 31 23 23.
   C. Compact per APWA Section 31 23 26 to a modified proctor density of 95 percent or greater. Maximum lift thickness before compaction is 8 inches when using riding compaction equipment or 6 inches when using hand held compaction equipment.

2. **BACKFILL:** Provide and place per APWA Section 31 23 23 on all sides of manhole. Compact per APWA Section 31 23 26 to a modified proctor density of 95 percent or greater. Maximum lift thickness is 8 inches before compaction.

3. **REINFORCEMENT:** ASTM A 615, grade 60, deformed steel. See APWA Section 03 20 00 requirements.

4. **CONCRETE:** Class 4000 per APWA Section 03 30 04. Place concrete per APWA Section 03 30 10. Cure per APWA Section 03 39 00.

5. **COVER AND FRAME:** See Plan No. 305. Adjust concrete dimensions at frame accordingly.
Cast-in-place manhole

TABLE OF DIMENSIONS

<table>
<thead>
<tr>
<th>PIPE I.D.</th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
<th>f</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;48</td>
<td>6&quot;</td>
<td>0</td>
<td>65-1/4&quot;</td>
<td>SEE TABLE OF MANHOLE COVERS</td>
<td></td>
</tr>
<tr>
<td>48</td>
<td>6&quot;</td>
<td>0</td>
<td>65-1/4&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>54</td>
<td>5-1/2&quot;</td>
<td>84-1/2&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>7</td>
<td>91-1/2&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>66</td>
<td>9</td>
<td>98-1/2&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TABLE OF MANHOLE COVERS

<table>
<thead>
<tr>
<th>TYPE</th>
<th>d</th>
<th>f</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>39-3/4&quot;</td>
<td>27-3/4&quot;</td>
</tr>
<tr>
<td>B</td>
<td>65-1/4&quot;</td>
<td>53-1/4&quot;</td>
</tr>
<tr>
<td>C</td>
<td>90-3/4&quot;</td>
<td>78-3/4&quot;</td>
</tr>
<tr>
<td>D</td>
<td>116-1/4&quot;</td>
<td>104-1/4&quot;</td>
</tr>
</tbody>
</table>
Adjust reinforced concrete deck to grade

1. BACKFILL: Provide and place per APWA Section 31 23 23. Compact per APWA Section 31 23 26 to a modified proctor density of 95 percent or greater. Maximum lift thickness is 8 inches before compaction.

2. REINFORCEMENT: ASTM A 615, grade 60, deformed steel. See APWA Section 03 20 00 requirements.

3. CONCRETE: Class 4000 per APWA Section 03 30 04. Place concrete per APWA Section 03 30 10. Cure per APWA Section 03 39 00.

4. COVER AND FRAME: For storm drain application see Plan No. 305. Adjust concrete dimensions at frame accordingly.
Adjust reinforced concrete deck to grade

Plan No. 335

February 2003

161
Precast manhole

1. UNTREATED BASE COURSE: Provide material specified in APWA Section 32 11 23.
   A. Do not use gravel as a substitute for untreated base course without ENGINEER’s permission.
   B. Place material per APWA Section 31 23 23.
   C. Compact per APWA Section 31 23 26 to a modified proctor density of 95 percent or greater. Maximum lift thickness before compaction is 8 inches when using riding compaction equipment or 6 inches when using hand held compaction equipment.

2. BACKFILL: Provide and place per APWA Section 31 23 23. Compact per APWA Section 31 23 26 to a modified proctor density of 95 percent or greater. Maximum lift thickness is 8 inches before compaction.

3. CONCRETE: Class 4000 per APWA Section 03 30 04. Place concrete per APWA Section 03 30 10. Cure per APWA Section 03 39 00.

4. STATIONING AND ELEVATIONS:
   A. Stations of manholes shown on the Drawings apply to the centerline of the shaft.
   B. Elevations shown at the shaft's center refer to the prolonged (or extended) invert grade of the pipe.
   C. Inlet pipe elevation applies to a point of intersection of the inlet pipe invert to the manhole wall.

5. CONCRETE DECK OR REDUCING RISER: When depth of manhole from pipe invert to finish grade exceeds 6'-7", use an ASTM C 478 reducing riser cone.

6. DISTANCE “P”: “P” varies as per size of pipes, such that the horizontal inside diameter of the pipe intersects the inside face of the riser.

7. JOINTS: Place flexible gasket-type sealant in all manhole joints.

8. BASE OF MANHOLE: Pour in one continuous operation.

9. FINISH: Provide smooth and neat finishes on interior of cones, shafts, and rings. Imperfect moldings or honeycombs will not be accepted.
CAST-IN-PLACE BASE

FRAME AND COVER (PLAN No. 302 OR 303)

RAISE FRAME TO GRADE (PLAN No. 360 OR 361)

DECK OR RISER (NOTE 5)

2.5" (MIN)
12" (MAX)

BACKFILL (NOTE 2)

CONCRETE COLLAR ALL AROUND (TYP)

RCP CL III RISER PER ASTM C 47B

DISTANCE "P" (NOTE 6)

UNTREATED BASE COURSE (NOTE 1)

SECTION A-A

SECTION B-B

Precast manhole

Plan No. 341

August 2001

Drawing 1 of 2

Table of Dimensions

<table>
<thead>
<tr>
<th>MANHOLE TYPE</th>
<th>DIMENSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>X = 48&quot; (Y = 30&quot;)</td>
</tr>
<tr>
<td>B</td>
<td>X = 60&quot; (Y = 44&quot;)</td>
</tr>
<tr>
<td>C</td>
<td>X = 60&quot; (Y = 30&quot;)</td>
</tr>
</tbody>
</table>
**Precast manhole**

1. **UNTREATED BASE COURSE:** Provide material specified in APWA Section 32 11 23.  
   A. Do not use gravel as a substitute for untreated base course without ENGINEER’s permission.  
   B. Place material per APWA Section 31 23 23.  
   C. Compact per APWA Section 31 23 26 to a modified proctor density of 95 percent or greater. Maximum lift thickness before compaction is 8 inches when using riding compaction equipment or 6 inches when using hand held compaction equipment.

2. **BACKFILL:** Provide and place per APWA Section 31 23 23. Compact per APWA Section 31 23 26 to a modified proctor density of 95 percent or greater. Maximum lift thickness is 8 inches before compaction.

3. **CONCRETE:** Class 4000 per APWA Section 03 30 04. Place concrete per APWA Section 03 30 10. Cure per APWA Section 03 39 00.

4. **STATIONING AND ELEVATIONS:**  
   A. Stations of manholes shown on the Drawings apply to the centerline of the shaft.  
   B. Elevations shown at the shaft's center refer to the prolonged (or extended) invert grade of the pipe.  
   C. Inlet pipe elevation applies to a point of intersection of the inlet pipe invert to the manhole wall.

5. **CONCRETE DECK OR REDUCING RISER:** When depth of manhole from pipe invert to finish grade exceeds 6'-7", use a reducing riser section.

6. **DISTANCE “P”:** “P” varies as per size of pipes, such that the horizontal inside diameter of the pipe intersects the inside face of the riser.

7. **JOINTS:** Place flexible gasket-type sealant in all manhole joints.

8. **BASE OF MANHOLE:** Pour in one continuous operation.

9. **FINISH:** Provide smooth and neat finishes on interior of cones, shafts, and rings. Imperfect moldings or honeycombs will not be accepted.
 PIPE PASS-THROUGH BASE

TABLE OF DIMENSIONS

<table>
<thead>
<tr>
<th>MANHOLE TYPE</th>
<th>DIMENSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>X = 48&quot; Y = 30&quot;</td>
</tr>
<tr>
<td>B</td>
<td>X = 60&quot; Y = 44&quot;</td>
</tr>
<tr>
<td>C</td>
<td>X = 60&quot; Y = 30&quot;</td>
</tr>
</tbody>
</table>

FRAME AND COVER (PLAN No. 302 OR 303)
RAISE FRAME TO GRADE (PLAN No. 360 OR 361)
DECK OR RISER (NOTE 5)
2.5" (MIN) 12" (MAX)
BACKFILL (NOTE 2)
RCP CL III RISER PER ASTM C 478
CONCRETE COLLAR ALL AROUND (TYP)
BREAK OUT AND GROUT SMOOTH
UNTREATED BASE COURSE (NOTE 1)

SECTION A-A

SECTION B-B

Precast manhole

Plan No. 341

August 2001

165
Concrete Deck

1. REINFORCEMENT: ASTM A 615, grade 60, deformed steel. See APWA Section 03 20 00 requirements.

2. CONCRETE: Class 4000 per APWA Section 03 30 04. Place concrete per APWA Section 03 30 10. Cure per APWA Section 03 39 00.
### 48" DECK PLAN

- **#5 Bars @ 6" O.C.**
- **Both Directions Bottom Face**
- **27" or 30" Opening**

### 60" DECK PLAN

- **#5 Bars @ 6" O.C.**
- **Both Directions Bottom Face**

### 60" DECK PLAN

- **35" or 44" Opening**

### Section

- **2" CLEAR**

---

**Concrete deck**

Plan No. 345

April 1997
1. CONCRETE: Class 4000 per APWA Section 03 30 04. Place concrete per APWA Section 03 30 10. Cure per APWA Section 03 39 00.
PLASTIC FORM OBLIQUE

PLASTIC FORM DETAIL

DECK SECTION

CONE SECTION

Raise frame to grade - plastic form
1. CONCRETE: Class 4000 per APWA Section 03 30 04. Place concrete per APWA Section 03 30 10. Cure per APWA Section 03 39 00.

2. REINFORCEMENT: ASTM A 615, grade 60 steel per APWA Section 03 20 00.
   A. 2 1/2" High Rings: Provide two 1/4" diameter steel hoops tied with No. 14 AWS gage wire, 8" on center.
   B. 6" and 8" High Rings: Provide four 1/4" diameter steel hoops, tied with No. 14 AWS gage wire, 8" on center.

3. JOINTS: Seat rings with a compressible gasket for non-pressurized applications.
See Ring Detail

12" Maximum
2.5" Minimum

Concrete Deck
(Plan No. 345)

Deck Section

Concrete Cone
ASTM C 478

Conf Section

To Ring Center

6"

1 1/2" 1 1/2"

1 1/4" 1/4"

1 1/2"

Varies

1"

1 1/4"

1 3/4" 1"

1 3/4" 2 3/4"

Reinforcement
(Note 2)

Ring Detail

Tie Wire (Typ)

Rubber Gasket to
Completely Fill Void

Gasket Detail

Raise frame to grade - grade ring
**Cover collar for storm drains**

1. **CONCRETE:** Class 4000 per APWA Section 03 30 04. Place concrete per APWA Section 03 30 10. Cure per APWA Section 03 39 00.

2. **JOINTS:** Provide a neat straight joint between existing and new asphalt concrete surfaces. Provide concentric circle or straight edge cut. Clean edges of all dirt, oil and loose debris.
CONCRETE COVER COLLAR (NOTE 1)

CONCRETE TO BE SET 1/4" MIN. TO 1/2" MAX. BELOW PAVEMENT LIP ALL AROUND

MATCH CROSS SLOPE GRADE

GRADE RINGS ARE SHOWN PLASTIC FORMS ARE ACCEPTABLE (PLAN No. 360 or 361)

SECTION A–A

SECTION B–B

Cover collar for storm drains
Area drain pipe

1. BACKFILL: Provide and place per APWA Section 33 05 20. Compact per APWA Section 31 23 26 to a modified proctor density of 95 percent or greater. Maximum lift thickness is 8 inches before compaction.
Area drain pipe
Concrete pier

1. BACKFILL: Install and compact all backfill material per APWA Section 33 05 20.

2. CONCRETE: Class 4000 per APWA Section 03 30 04.
**NARRATIVE**

Use caution when crossing over buried pipeline. The purpose for providing the piers shown in this drawing is to protect the underlying pipeline from current and future loads imposed by the backfilling operation.

**CONCRETE PIER DETAILS**

Install concrete pier

Existing pipe do not disturb

Pipe bedding or stabilization as required

Undisturbed earth, stabilization material or pipezone materials as required

Fill void over sewer pipe with sand. Minimize compaction enough to allow further compression of the sand fill material through time.

**SECTION A-A**

供应和安装2个每3英尺长的#4钢筋，3英寸中心间距3英寸最小嵌入。在3英寸中心间距3英寸最小嵌入。

**OBLIQUE**

Concrete pier
Trench backfill

1. BACKFILL: Above the pipe zone.
   A. Granular Fill. Limit maximum particle size to 6 inches. Place fill per APWA Section 33 05 20. Compact to a modified proctor density of 95 percent or greater. Maximum lift thickness is 8 inches before compaction. Do not use clay without ENGINEER’s review and acceptance. Water jetting is NOT allowed in backfilling operation.
   B. Flowable Fill. Provide and place controlled low strength material per APWA Section 31 05 15. Cure the fill before placing surface restorations.

2. LANDSCAPED RESTORATION: Provide landscaped surfaces with topsoil. Rake to match existing grade. Replace vegetation to match pre-construction conditions. See APWA Section 32 92 00 or APWA Section 32 93 13 requirements.

3. PAVEMENT RESTORATION: Do not install asphalt or concrete surfacing until trench compaction is accepted by ENGINEER.

4. PEA GRAVEL: Pea gravel is not allowed in any part of the trench.
SECTION

Trench backfill

Plan No. 381

May 2006
EXCAVATE TRENCH
WIDTH OF TRENCH = OD OF PIPE + 18"

IS FOUNDATION SOIL SUITABLE?
IF SOIL IS TOO WET TO COMPACT TO A FIRM AND UNYIELDING STATE, IT IS NOT SUITABLE

YES

EXCAVATE TRENCH TO ALLOW FOR A MINIMUM OF 6" BEDDING MATERIAL

COMPACT FOUNDATION TO A FIRM AND UNYIELDING STATE

OVER EXCAVATE TRENCH A MIN OF 12", MAY REQUIRE MORE DEPENDING ON CONDITIONS

DEWATER TRENCH

INSTALL FILTER FABRIC IN SUCH A WAY AS TO COVER THE SIDES AND FOUNDATION OF TRENCH

INSTALL FILTER FABRIC ON TOP OF CLEAN GRAVEL OR COBBLE

LAY PIPE, SUPPORT ENTIRE LENGTH, SHAPE TRENCH TO PIPE (PROVIDE BELL HOLES IF PRESENT)

LAY PIPE, SUPPORT ENTIRE LENGTH, SHAPE TRENCH TO PIPE (PROVIDE BELL HOLES IF PRESENT)

TEST BEDDING MATERIAL EVERY 200 LF TO 95% STANDARD PROCTOR

TEST INITIAL BACKFILL MATERIAL EVERY 200 LF TO 95% STANDARD PROCTOR

PLACE FINAL BACKFILL WITH GRANULAR BACKFILL BORROW

PLACE INITIAL BACKFILL USING GRADE 3/4 UNTREATED BASE COURSE, IN LOOSE 8" MAX LIFTS, AND THEN COMPACT TO 95% STANDARD PROCTOR

BACKFILL TO THE SPRING LINE OF THE PIPE WITH APPROVED BACKFILL MATERIAL (SEE GEN. NOTES), 8" MAX LIFTS

HAND COMPACT MATERIAL UNDER PIPE HAUNCHES BY SHOVEL, SLICING THE ENTIRE LENGTH OF THE PIPE, AVOID LIFTING THE PIPE

PLACE INITIAL BACKFILL USING GRADE 3/4 UNTREATED BASE COURSE, IN LOOSE 8" MAX LIFTS, AND THEN COMPACT TO 95% STANDARD PROCTOR

GEN. NOTES:
GRADATION DOCUMENTATION, CLASSIFICATION AND PROCTORS SHALL BE PROVIDED TO CITY ENGINEER FOR APPROVAL PRIOR TO PLACEMENT OF MATERIAL. GRADATION SHALL MEET 100% PASSING 3/8" SIEVE, AND LESS THAN 12% PASSING THE #200 SIEVE (CLAY).
ADDITIONAL FILTER FABRIC MAY BE REQUIRED BY CITY ENGINEER AT THE INTERFACE OF THE INITIAL AND FINAL BACKFILL, IF THE MATERIALS DIFFER SIGNIFICANTLY IN GRADATION (PEA GRAVEL TO PIT RUN)
ANY VARIANCE FROM THIS FLOW CHART MUST BE APPROVED IN WRITING BY CITY ENGINEER