### General Notes:

1. Drainage structures shall be cast in place or precast units having dimensions and materials consistent with the general notes and specific requirements of the particular project.

2. Drainage structures shall be placed in accordance with the specifications and drawings.

3. Drainage structures shall be made of concrete, masonry, or other suitable materials.

4. Drainage structures shall be designed to withstand the forces and stresses imposed by the water flow and the surrounding soil conditions.

5. Drainage structures shall be properly sealed at all joints and connections.

6. Drainage structures shall be placed in a manner that allows easy access for maintenance and inspection.

### Drainage Structure Details:

#### Rectangular Drainage Structure

**Type A, Through P**

Material: Cast iron manhole frame and grate (see Note 6 and 12)

Wall thickness: Not less than 6" between the top of the highest pipe entry and the formed invert (see Note 7).

Height: A

Foundation: Cast iron manhole frame and grate (see Note 6 and 12)

**Rectangular Drainage Structure**

Type A, Through P

**Excavation and Backfill Limits and Materials**

- **Existing Excavation Limits:**
  - 1'-4" Max.

- **Backfill:**
  - 1'-4" Max.

**Dredging:**

- 1'-4" Max.

**Drainage Structure Reinforcement**

<table>
<thead>
<tr>
<th>Frame Type</th>
<th>Pay Item Code</th>
<th>$/Yd²</th>
</tr>
</thead>
<tbody>
<tr>
<td>XX</td>
<td></td>
<td></td>
</tr>
<tr>
<td>YY</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**DRAINAGE STRUCTURE REINFORCEMENT**

**PAY ITEM DESCRIPTION**

- **RC 2"**:
  - 6" Min.

- **RC 3"**:
  - 8" Min.

- **RC 4"**:
  - 10" Min.

**PAY ITEM LIMITS**

- **Up to 10 Misc.**: 600.00

- **Up to 15 Misc.**: 900.00

**STATE OF NEW YORK**

**DEPARTMENT OF TRANSPORTATION**

**COLLECTIVE STANDARD SHEET**

**DRAINAGE STRUCTURE DETAILS (Sheet 1 of 4)**

**APPROVED SEPTEMBER 19, 2008**

** ff 604-02**

**Effective Date:** 01/01/09

**Issued Under ES 08-09**

**Sheet Number:** 56

**Drawn By:**

**Checked By:**

**Approved By:**

**Revision:** 06/03
**BOTTOM REINFORCEMENT**

<table>
<thead>
<tr>
<th>TYPE</th>
<th>BAR LENGTH</th>
<th>BAR LIST</th>
<th>BOTTOM REINFORCEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>#6</td>
<td>5'-4&quot;</td>
<td>6' x 6&quot;</td>
<td>W4 x W4 fabric</td>
</tr>
<tr>
<td>#6</td>
<td>5'-0&quot;</td>
<td>6' x 6&quot;</td>
<td>W4 x W4 fabric</td>
</tr>
<tr>
<td>#7</td>
<td>5'-2&quot;</td>
<td>6' x 6&quot;</td>
<td>W4 x W4 fabric</td>
</tr>
<tr>
<td>#7</td>
<td>5'-0&quot;</td>
<td>6' x 6&quot;</td>
<td>W4 x W4 fabric</td>
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<tr>
<td>#6</td>
<td>5'-0&quot;</td>
<td>6' x 6&quot;</td>
<td>W4 x W4 fabric</td>
</tr>
<tr>
<td>#7</td>
<td>5'-0&quot;</td>
<td>6' x 6&quot;</td>
<td>W4 x W4 fabric</td>
</tr>
</tbody>
</table>

**SHORT W BAR**

- #7 5'-0" W4 x W4 fabric
- #7 5'-0" W4 x W4 fabric
- #7 5'-0" W4 x W4 fabric
- #7 5'-0" W4 x W4 fabric
- #7 5'-0" W4 x W4 fabric
- #7 5'-0" W4 x W4 fabric

**LONG L BAR**

- #7 5'-0" W4 x W4 fabric
- #7 5'-0" W4 x W4 fabric
- #7 5'-0" W4 x W4 fabric
- #7 5'-0" W4 x W4 fabric
- #7 5'-0" W4 x W4 fabric
- #7 5'-0" W4 x W4 fabric

**TOP SLAB DIMENSIONS**

- 6'-0" 6' x 6" W4 x W4 fabric
- 6'-0" 6' x 6" W4 x W4 fabric
- 6'-0" 6' x 6" W4 x W4 fabric
- 6'-0" 6' x 6" W4 x W4 fabric
- 6'-0" 6' x 6" W4 x W4 fabric
- 6'-0" 6' x 6" W4 x W4 fabric

**TYPICAL EDGE BAR**

- 6'-0" 6' x 6" W4 x W4 fabric
- 6'-0" 6' x 6" W4 x W4 fabric
- 6'-0" 6' x 6" W4 x W4 fabric
- 6'-0" 6' x 6" W4 x W4 fabric
- 6'-0" 6' x 6" W4 x W4 fabric
- 6'-0" 6' x 6" W4 x W4 fabric

**TYPICAL W, L BAR, O, D BAR**

- 6'-0" 6' x 6" W4 x W4 fabric
- 6'-0" 6' x 6" W4 x W4 fabric
- 6'-0" 6' x 6" W4 x W4 fabric
- 6'-0" 6' x 6" W4 x W4 fabric
- 6'-0" 6' x 6" W4 x W4 fabric
- 6'-0" 6' x 6" W4 x W4 fabric
**PRECAST ROUND ALTERNATE**

**DRAINAGE STRUCTURES**

**TYPES Q, R, S, T, AND U**

**Inside Dimensions**
- **Precast**
- **Cast in Place**

**PERIMETER**
- **Top of Pavement**
- **Height**
- **Depth**

**Rectangular Drainage Structure**

**Inside Dimensions**

- **Precast**
- **Cast in Place**

**PRECAST ROUND MANHOLES**

<table>
<thead>
<tr>
<th>Item</th>
<th>Type</th>
<th>Dimensions</th>
<th>Vertical Foot</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRECAST</td>
<td>48</td>
<td>54.6</td>
<td>48</td>
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<tr>
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<tr>
<td>PRECAST</td>
<td>72</td>
<td>72.0</td>
<td>72</td>
<td>72</td>
</tr>
</tbody>
</table>

**NOTES**

1. THE DIAMETER OF THE ALTERNATE ROUND UNIT MUST BE LESS THAN THE LARGER DIAMETER OF THE SPECIFIED RECTANGULAR UNIT IT REPLACES.
2. THE HOLES MUST BE DETAILED TO THE CENTERLINE OF ALL PIPES INTERCEPTING AT THE CENTER OF THE ROUND ALTERNATE.
4. THE SUM OF THE MINIMUM ANGLES BETWEEN HOLES AT THE SAME LEVEL MUST NOT BE MORE THAN 360 DEGREES. THEY MUST BE DETAIL TO THE CENTERLINE OF THE HOLES SHOWN IN THE TABLE ABOVE.
5. A HOLES OR HOLES IN HOLES INDICATES THAT THE HOLES SPACE IS TOO SMALL FOR THE HOLES AT THAT LEVEL.