

**Standard Operating Procedure:
Data Collection, Processing, and Reporting for
Catch Basin Cleaning Operations**

Department of Energy and Environment

Water Quality Division – Planning and Reporting Branch

1200 First Street NE Washington DC 20002

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List of Abbreviations:

BMP – Best Management Practice

CWP – Center for Watershed Protection

DOEE – Department of Energy and Environment

MS4 – Municipal Separate Storm Sewer System

TSS – Total Suspended Solids

QA – Quality Assurance

Purpose:

The procedures described in this document are used by the District of Columbia for the following purposes:

- Estimating nutrient reduction for reporting to the Chesapeake Bay Program
- Calculating the number of catch basins in the MS4 area, the number of catch basins that have been inspected, and number of catch basins that have been cleaned for the MS4 Annual Report
- Serve as the MS4 Permit Annual Report and Stormwater Management Plan catch basin study deliverable

Background and Overview:

Catch basins in the District of Columbia are cleaned on a regular basis by DC Water to ensure the sewer systems functions properly and to remove excess material from the system. These activities help reduce street flooding and prevent significant amounts of trash and debris from entering the city's rivers and streams. DC Water has begun to track the cleaning operations through a mobile app. Cleaning activities are recorded for each individual catch basin which is visited, including asset number, storm drain type, and approximate debris levels before and after cleaning takes place. DOEE receives this catch basin cleaning data from DC Water and conducts quality assurance (QA) and data processing efforts for reporting purposes. DOEE has reviewed catch basin dimensions associated with each catch basin type to estimate the volume of each individual catch basin reported (Appendix 1). DOEE uses literature values established from a catch basin cleaning study conducted in a similar urban setting in Baltimore, Maryland to convert the volume of removed material into a total wet weight of material. That total wet weight is then partitioned into weights of three components: sediment, organics, and trash (Law 2008). DOEE then uses conversion methods provided by the Chesapeake Bay Expert Panel report for catch basin cleaning to estimate the amount of nutrients removed as a result of cleaning (Schueler 2016). As recommended by the Expert Panel report, DOEE utilizes the protocols established by Baltimore County to calculate TSS removal from wet weight measurements.

Previous reports show that DC Water removed approximately 4,589 and 5,190 tons of materials from catch basins during 2011 and 2012, respectively (DC Water 2013). These estimated values agree with a statement on the DC Water website that estimates cleaning crews remove "23 tons of debris everyday" from catch basins (DC Water 2020). The weight estimates generated from the method proposed here are below weights shown in DC Water's tracking of disposal from 2011 and 2012, which suggests the current method still provides conservative debris removal weights.

Catch basin cleaning frequency has not changed significantly during the time period from the year 2000 to the year 2020.

Section I – City-wide Catch Basin Nutrient Removal Calculation Procedure:

1. Accessing Catch Basin Cleaning Data:

DC Water provides data to DOEE regarding catch basin cleaning. The main points of contact from DC Water to obtain catch basin cleaning information are found in the table below:

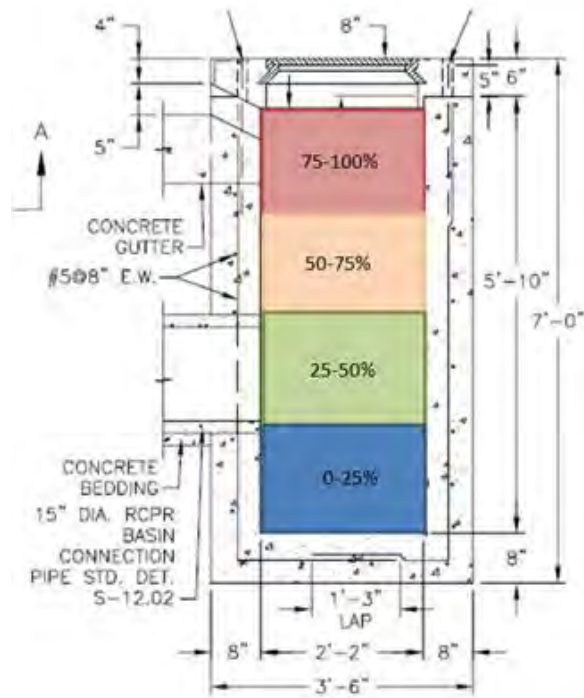
Table 1. DC Water Contact Information

Name	Email	Title/Position
Sigi Sharp	sigi.sharp@dcwater.com	Manager, Construction & Repair
Clarence McCray	clarence.mccray@dcwater.com	Program Manager, Catch Basins
Mohsin Siddique	mohsin.siddique@dcwater.com	Supervisor, Environmental Planning (retired)
Salil Kharkar	salil.kharkar@dcwater.com	Senior Vice President Operations and Engineering

2. Catch Basin Cleaning Data Protocols and Documentation

The Catch Basin Status information provided by DC Water provides the estimated percent of the total volume that is filled with debris. This estimate is selected from one of the following options (0%, 25%, 50% or 100%) using best professional judgement of cleaning crew members and is entered into the mobile app. Figure 1 below illustrates the Catch Basin Status metric.

Figure 1. Catch Basin Status Illustration.



In addition, within the raw data shared by DC Water, each individual catch basin is assigned a “subtype” as described in the table below.

Table 2. Catch Basin Subtypes, Volumes, and District Wide Count for Reporting Year (RY) 2020

Subtype	SubTypeDescription	Volume (Cubic Feet)	Count of Basins (RY 2020)
1	SINGLE	44	10521
2	DOUBLE	105	3996
3	TRIPLE	166	1785
4	GRATE	38	1053
5	QUADRUPLE*	211	509
6	ELONGATE*	44	6815
7	DOUBLE GRATE	85	518
8	FIELD DRAIN*	44	38
9	TRRENCH DRAIN*	1**	3
10	QUINTUPLE*	272	29
11	GI OVERFLOW CIRCULAR*	1**	1
12	TRIPLE GRATE*	122	20
13	GI OVERFLOW RECTANGULAR*	1**	2
14	WSSC*	1**	3
15	GI SUMP*	1**	0
0	UNKNOWN*	44	246

*No diagrams available – Estimate represents best professional judgement

** No volume estimate developed because no diagram was available and the catch basin count showed a small total within the city

3. Catch Basin Dimension Information:

DC Water and the Department of Transportation have established general guidelines for the installation of new catch basins within the sewer system (Appendix 1). While the dimensions of each catch basin within the system may vary based on specific site conditions, there is standard guidance on how a catch basin of a specific subtype will be constructed. The official documentation related to catch basin dimensions for most can be found in the DC Water Sewer Details Binder in Appendix 1. For the remaining catch basin types, best professional judgement was used to estimate volume. A summary of estimated catch basin volumes is provided in Table 2 above. The values from Table 2 are used by DOEE to calculate the actual volume of debris removed from the catch basin.

4. Data Processing:

4.1 Individual Catch Basin Volume Reduction Calculation:

To determine the amount of material that has been removed from an individual catch basin, DOEE staff subtract the estimated volume reported for the catch basin after cleaning from the volume reported for the catch basin before cleaning as shown in the formula below:

$$\text{Percent Volume Reduced} = \text{CBBBSTATUS} - \text{CBACSTATUS}$$

Where:

CBBCSTATUS – Catch Basin Before Cleaning Status

CBACSTATUS – Catch Basin After Cleaning Status

4.2 Estimating Total Volume Removed

To estimate the total volume removed from the catch basin system, DOEE uses information on the individual catch basin volume reduced along with the general dimensions of each catch basin type. Within the DC Water tracking system, each catch basin is labelled with the associated catch basin type (aka sub-type) as seen in Table 2. The catch basin percent volume reduction for each catch basin is then multiplied by the total volume for the associated catch basin type.

Volume Removed from Individual Catch Basin =

$$\text{Percent Volume Reduced} \quad \times \quad \text{Individual Catch Basin Volume}$$

The sum of all volumes removed within the system is then calculated to determine the total volume of material removed throughout the city.

4.3 Converting Debris Volume to Wet Mass

After the volume of debris is calculated from the percent full data and the catch basin type information associated with each cleaning event, a wet mass is calculated. This conversion is based on data collected in a study in Baltimore by the Center for Watershed Protection (CWP) (Law 2008). This study showed that the bulk density of debris found within catch basins was 331 pounds per cubic yard before drying. The following equation is used for the conversion of volume data to wet mass:

$$\text{Total Weight (Wet Mass)} = \text{Volume (cubic yards)} \times 331 \text{ lbs/cubic yard}$$

4.4 Catch Basin Composition - Debris Types

The CWP study (Law 2008) also provides estimates of the composition of the debris within each catch basin. The study estimated that the wet mass of debris collected from catch basins is divided amongst 3 categories as listed in Table 3 below.

Table 3. Mean Composition of Materials Removed

% Sediment	39.00
% Leaves	52.10
% Trash	8.90

As a result, the formula to calculate the wet mass of each category is shown below:

$$\text{Sediment Weight (Wet Mass)} = \text{Total Weight} \times 0.39$$

$$\text{Leaf Weight (Wet Mass)} = \text{Total Weight} \times 0.521$$

$$\text{Trash Weight (Wet Mass)} = \text{Total Weight} \times 0.089$$

4.5 Converting Wet Mass to Dry Weight

Using the guidance and background information provided in the Chesapeake Bay Expert Panel Report (Schueler 2016), wet mass is converted to dry mass. In the absence of local data, the conversion factor for wet sediments is 0.7 (CSN 2011) and 0.2 for wet organic matter (Stack 2013). The formulae used for those conversions are listed below:

$$\text{Sediment Dry Weight} = \text{Sediment Wet Mass} \times 0.7$$

$$\text{Organic Matter Dry Weight} = \text{Organic Matter (Leaves) Wet Mass} \times 0.2$$

4.6 Converting Dry Weight to Mass of Phosphorus and Nitrogen Removed

Continuing to follow the guidance provided by the Chesapeake Bay Expert Panel Report, dry weights of sediment and organic matter are then converted into the mass of nutrients to be reported and credited in the Chesapeake Bay Watershed Model. The expert panel provides details on the nutrient enrichment factors associated with each debris type as shown in the table below (Schueler 2016).

Table 4. Mean Nutrient Enrichment Factor to Apply to Dry Weight Mass of Solids Physically Removed from Storm Drains

Nutrient Enrichment Factor	% Phosphorus	% Nitrogen
Catch Basin Sediments	0.06	0.27
Catch Basin Leaves/Organic Matter	0.12	1.11

DOEE uses the information provided above in the following formulae to determine the mass of nutrients reduced.

Sediment:

$$\text{Phosphorus Mass from Sediments} = \text{Sediment Dry Weight} \times 0.0006$$

$$\text{Nitrogen Mass from Sediments} = \text{Sediment Dry Weight} \times 0.0027$$

Organic Matter/Leaves:

$$\text{Phosphorus Mass from Organic Matter/Leaves} = \text{Organic Matter Dry Weight} \times 0.0012$$

$$\text{Nitrogen Mass from Organic Matter/Leaves} = \text{Organic Matter Dry Weight} \times 0.0111$$

4.7 Calculating TSS Reduction

The reduction of TSS through catch basin cleaning is mentioned within the Chesapeake Bay Program Expert Panel Report (Schueler 2016), but the report does not provide explicit instructions on calculating the reduction as it does with TN and TP. Instead, the report provides an example of a SOP from Baltimore County in Appendix F, which has been followed by other jurisdictions as well, for reporting TSS. DOEE has reached out to the authors of the expert panel report and they have also suggested using the protocols used by Baltimore County. As result, DOEE follows the protocols as described in Appendix F in the expert panel report to calculate load reduction of TSS.

The Baltimore County SOP states that there is a reduction of 420 lbs of TSS removed per ton of wet material removed. There is no differentiation provided between sediment or organic matter, so the rate of 420 lbs of TSS removed per wet ton is applied to both sediment and organic material components. DOEE has determined that the rate of 420 lbs of TSS per ton of wet material is equivalent to 0.21 lbs of TSS per pound of wet material. The following equations are used to convert wet sediment and wet organic material calculations into pounds of TSS removed:

$$\text{TSS Removed (lbs) from Sediment} = \text{Wet Sediment (lbs)} \times 0.21 \text{ lbs TSS/lb wet material}$$

$$\text{TSS Removed (lbs) from Organic Material} = \text{Wet Organic Material (lbs)} \times 0.21 \text{ lbs TSS/lb wet material}$$

The total TSS reported to the Chesapeake Bay Program is the sum of TSS removed from sediment and TSS removed from organic material.

Section II – MS4 Catch Basin Reporting – Inventory, Inspection, and Cleaning Calculations:

Background and Overview:

The MS4 annual report template requires DOEE to share the number of catch basins within the MS4 area within each year. DOEE is also required to report both the number of catch basins that have been inspected as well as the number that have been cleaned on annual basis. In order to conduct these calculations, data from the Catch Basin Cleaning App is retrieved from the DC Water contacts listed in Table 1 above. The data is reviewed to ensure it only holds information for the permit reporting cycle timeframe.

1. Calculating Number of Catch Basins in MS4 Permit Area

To calculate the number of catch basins in the MS4 permit area, DOEE uses the Catch Basin Table provided in the Microsoft Access database provided by DC Water. In 2019 and 2020, the Catch Basin Table provided a column labeled “INMS4”. This column is populated with a “Y” when the catch basin is within the MS4 area, and an “N” when the catch basin is outside the MS4 area. The full list of catch basins is then filtered to only view records with a value of “Y” for the “INMS4” field. The total number of records that fit this filtered search are recorded as the total number of catch basins in the MS4 area.

Example:

In 2019 the number of catch basins recorded in the MS4 area according to the DC Water Catch Basin App output was 16,387. It is suspected that this data is inaccurate since it does not match with the data provided in a presentation from DC Water from March of 2019, which stated the number of catch basins in the MS4 area to be 14,608.

In 2020 the number of catch basins recorded in the MS4 area according to the DC Water Catch Basin App output was 14,807.

Notes:

- DC Water has stated that the field labeled FLOWTOCSS = Y should be mutually exclusive from the INMS4 =Y, though DOEE has not found this to be the case.
- In 2019, DOEE reported a count of 15,700 catch basins in the MS4 area for the annual report. This number was based on a separate GIS analysis conducted by Young Tseui which used a catch basin map provided by DC Water that was clipped to the MS4 area.

2. Calculating Number of Catch Basin Inspections in MS4 Area

The number of catch basins that have been inspected within the MS4 area during a reporting cycle is calculated using the data provided by DC Water in the “Work Orders” table. This table shows many

different work order types in the “WorkType” field. The descriptions of the codes used for that field are located in the table below.

Table 5. DC Water Catch Basin Cleaning App - Work Type Codes and Descriptions

Code	Description
PM	Preventative Maintenance (annual cleaning)
EMERG	Emergency Work Orders (usually flooding)
INV	Investigation
EM	Emergency Repair
CM	Corrective Maintenance
INSP	Inspection

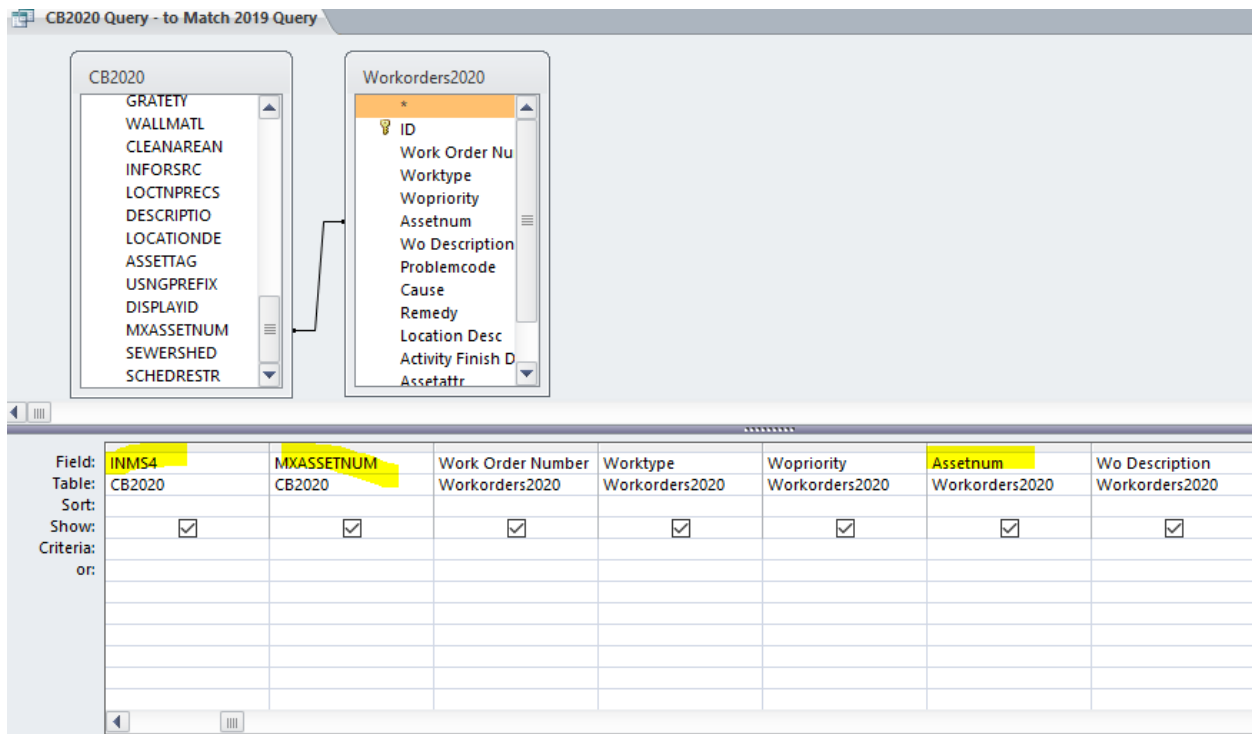
It is important to note that DOEE is calculating the number of catch basins that have been inspected, rather than the number of inspections which have occurred within the MS4 area. In the latter scenario, if a catch basin was visited/inspected more than once during a reporting period a higher count would be expected. For the actual count of catch basins inspected by DOEE, this means that the number of catch basins that have been inspected or cleaned can never exceed the total number of catch basins within the MS4 permit area.

- To conduct the calculation of the number of inspections, the database from DC Water containing the Catch Basin table and Work Order table is required. A relationship will be developed between the Catch Basin Table and the Work Order Table. The connection will be using the **MXASSETNUM** field from the Catch Basin table and the **ASSETNUM** field from the Work Orders Table (see figure below).
- Next a query is built to display at least the following fields:

Catch Basin Table: INMS4, MXASSETNUM

WorkOrders Table: ASSETNUM, ProblemCode, Remedy

Figure 2. Catch Basin Query Design View



- After the query is run, export the query to excel. Then using the INMS4 field, filter for only responses of Y to confirm that only the catch basin within the MS4 will be counted.
- Next filter the Remedy column to remove the entries that read “cancel” or “re-schd” to remove work orders that never were conducted and therefore would not count as an inspection.
- Finally, using the filtered spreadsheet, copy the entire MXASSETNUM field to a new spreadsheet and select the Remove Duplicates function on the column. The remaining list will be all the full list of all catch basins that were visited (inspected) during the reporting cycle. The count of those catch basins is the final count of catch basins that were inspected.

3. Calculating the number of Catch Basins Cleaned in the MS4 Area

The number of catch basins cleaned in the MS4 differs from the number of catch basins inspected as it eliminates work orders that did not involve cleaning. Catch basin cleanings do not include work orders that have the following Problem Codes: Broken, CBLoose, CBTooLow, TopLoose, NoAccess. It is assumed that the aforementioned Problem Codes are resolved without cleaning. Problem Codes including Clog, PM, Dumping, and InletDebris represent workorders that are resolved through cleaning.

- Start by using the excel spreadsheet generated above which is already filtered to eliminate cancelled and rescheduled work orders as well as work orders for catch basins outside the MS4.
- Filter the data in the ProblemCode column to only include codes related to cleaning, such as Clog, PM, Dumping and InletDebris.

- Using the filtered spreadsheet, copy the MXASSETNUM column to a new worksheet and select the Remove duplicates function for the column. The remaining list will be the full list each individual the catch basin that was actually cleaned during the reporting cycle. The count of those catch basins is the final count of catch basins that were cleaned.

Note: The number of catch basins that were cleaned may be the same number as the number of catch basins inspected, if there were no work orders for activities such as repairs to infrastructure. This was the case in the 2020 analysis. It is also possible that DC Water filtered out the repair work orders before sharing the database with DOEE.

References:

Chesapeake Stormwater Network (CSN). 2011. Nutrient accounting methods to document local stormwater load reductions in the Chesapeake Bay watershed. *Technical Bulletin No. 9*. Baltimore, MD.

DC Water (2013). Municipal Separate Storm Sewer Systems (MS4) Report on Optimal Plan for Catch Basin Cleaning, Inspection and Repair.

https://doee.dc.gov/sites/default/files/dc/sites/ddoe/page_content/attachments/CB%20Report%20Final%20062413%20BODY.pdf (Accessed August 26, 2020)

DC Water (2020). *Restoring our Rivers and Protecting the District – Catch Basins*.

<https://www.dcwater.com/stormwater> (Accessed August 26, 2020)

Law, N., DiBlasi, K., Ghosh, U. (2008). Deriving Reliable Pollutant Removal Rates for Municipal Street Sweeping and Storm Drain Cleanout Programs in the Chesapeake Bay Basin. Center for Watershed Protection, Ellicott City, MD. Pages 1-73.

Schuler, T. et al. (2016). Recommendations of the Expert Panel Report to Define Removal Rates for Street and Storm Drain Cleaning Practices. Chesapeake Bay Program Expert Panel Report.

Stack, B., N. Law, S. Drescher and B. Wolinski. 2013. Gross solids characterization study in the Tred Avon watershed, Talbot County, MD. Center for Watershed Protection. Ellicott City, MD.

Appendix 1. DC Water Sewer Details Binder

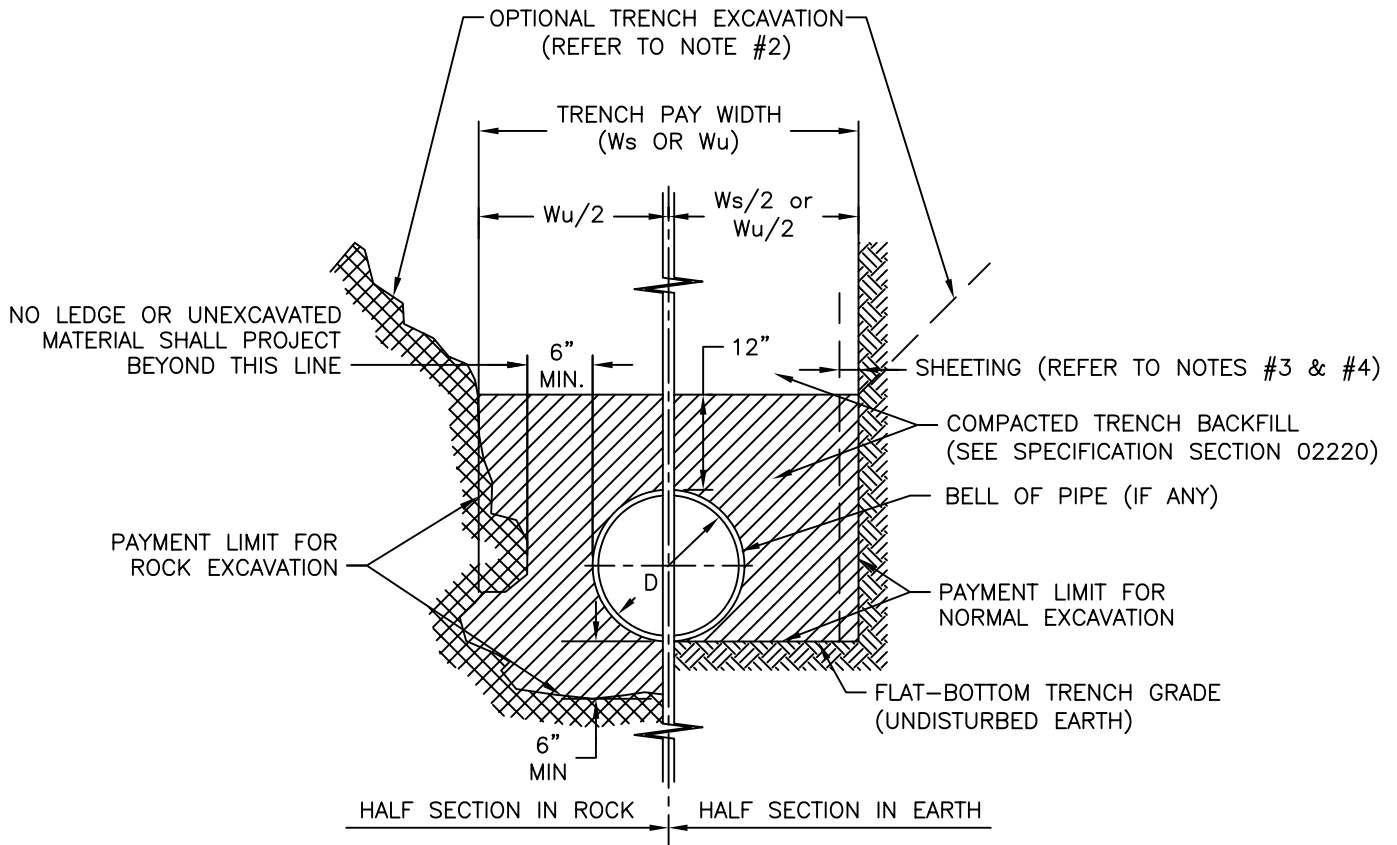
Appendix 2. Catch Basin Cleaning App Manual

Appendix 3. DC Water Catch Basin Cleaning Database – Key to Codes

Appendix 1. DC Water Sewer Details Binder

DISTRICT OF COLUMBIA
WATER AND SEWER AUTHORITY

S-10.01
1 OF 2



APPROVED DATE: June 20, 2003

DIRECTOR, DEPARTMENT OF ENGINEERING
AND TECHNICAL SERVICES

REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL
DUCTILE IRON SEWER
PIPE LAYING CONDITION TYPE 2A
(TRENCH INSTALLATION)

DISTRICT OF COLUMBIA
WATER AND SEWER AUTHORITY

S-10.01

2 OF 2

PIPE DIAMETER D	TRENCH PAY WIDTH	
	UNSHEETED (W _u)	SHEETED (W _s)
8"	2' - 10"	2' - 4"
12"	3' - 2"	2' - 8"
16"	3' - 6"	3' - 0"
20"	3' - 10"	3' - 4"
24"	4' - 2"	3' - 8"
30"	4' - 8"	4' - 2"
36"	6' - 1"	5' - 7"
42"	6' - 7"	6' - 1"
48"	7' - 1"	6' - 7"

NOTES:

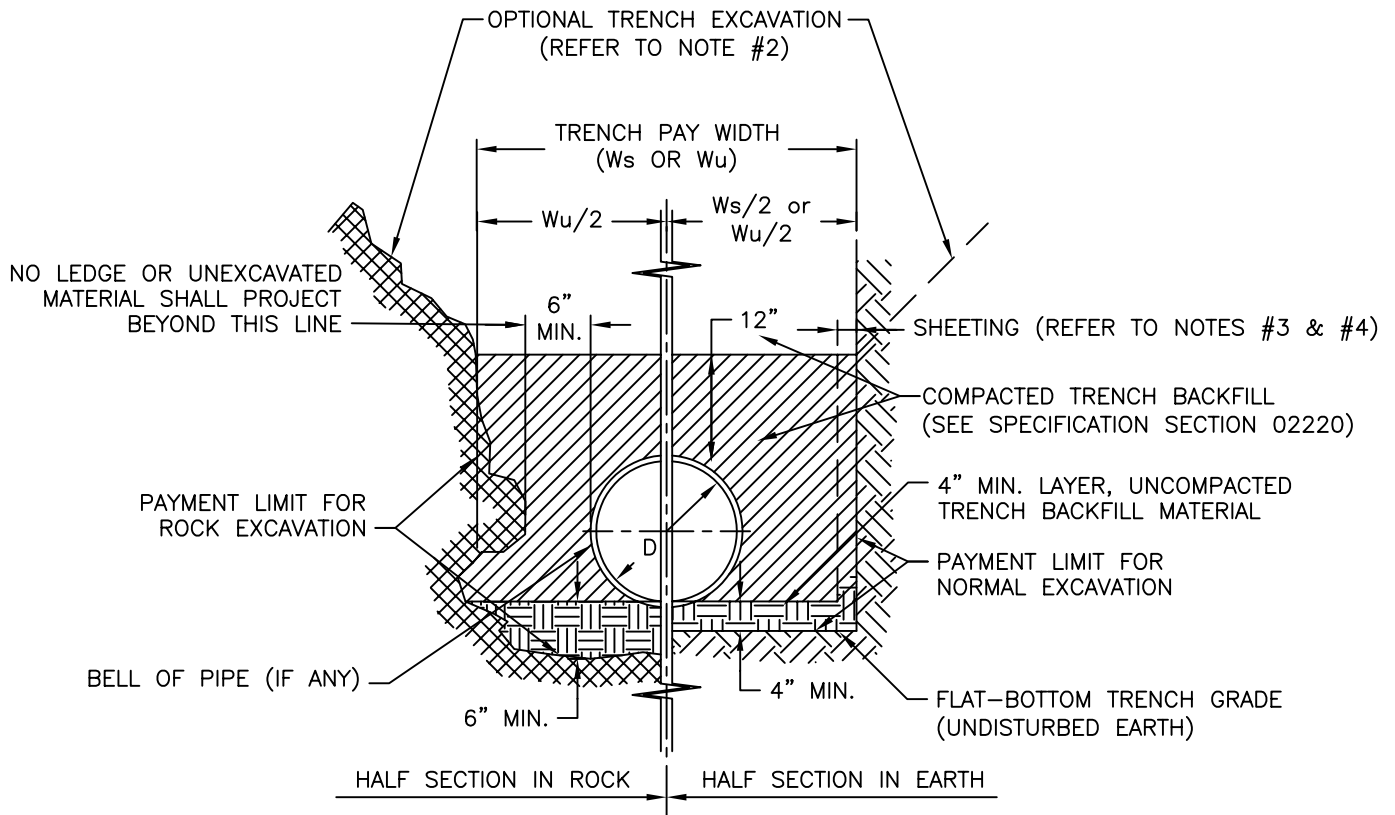
1. PIPE LAYING CONDITION TYPE 2A (TRENCH INSTALLATION) SHALL BE USED FOR ALL DUCTILE IRON PIPE SEWER CONSTRUCTION UNLESS OTHERWISE SPECIFIED.
2. TRENCHES MAY BE EXCAVATED WIDER THAN THE TRENCH PAY WIDTH (W_s OR W_u) ABOVE A LINE 1'-0" FROM TOP OF PIPE, AT CONTRACTOR'S OPTION AND AT NO ADDITIONAL COST TO THE AUTHORITY.
3. IF EXCAVATION TO A DEPTH GREATER THAN 4.5 FEET IS REQUIRED, EXCAVATION SUPPORT SHEETING MAY BE ORDERED OR TRENCH SHIELDS UTILIZED AT CONTRACTORS OPTION. COSTS UNDER THIS OPTION SHALL BE PART OF THE UNIT PIECE BID FOR EXCAVATION.
4. SHEETING, IF USED, SHALL BE REMOVED IN CONJUNCTION WITH THE BACKFILLING OPERATION UNLESS OTHERWISE SPECIFIED OR SHOW ON DRAWINGS. HOWEVER, IF APPROVED IN WRITING, SHEETING MAY BE CUT-OFF AND LEFT IN PLACE BELOW A LINE 1'-0" ABOVE THE TOP OF PIPE OR AS DIRECTED BY THE ENGINEER.

APPROVED DATE: June 20, 2003

DIRECTOR, DEPARTMENT OF ENGINEERING
AND TECHNICAL SERVICES

REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL
DUCTILE IRON SEWER
PIPE LAYING CONDITON TYPE 2A
(TRENCH INSTALLATION)



APPROVED DATE: June 20, 2003

DIRECTOR, DEPARTMENT OF ENGINEERING
AND TECHNICAL SERVICES

REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL
DUCTILE IRON SEWER
PIPE LAYING CONDITION TYPE 3A
(TRENCH INSTALLATION)

PIPE DIAMETER D	TRENCH PAY WIDTH (Ws or Wu)	
	UNSHEETED (Wu)	SHEETED (Ws)
8"	2' - 4"	2' - 10"
12"	2' - 8"	3' - 2"
16"	3' - 0"	3' - 6"
20"	3' - 4"	3' - 10"
24"	3' - 8"	4' - 2"
30"	4' - 2"	4' - 8"
36"	5' - 7"	6' - 1"
42"	6' - 1"	6' - 7"
48"	6' - 7"	7' - 1"

NOTES:

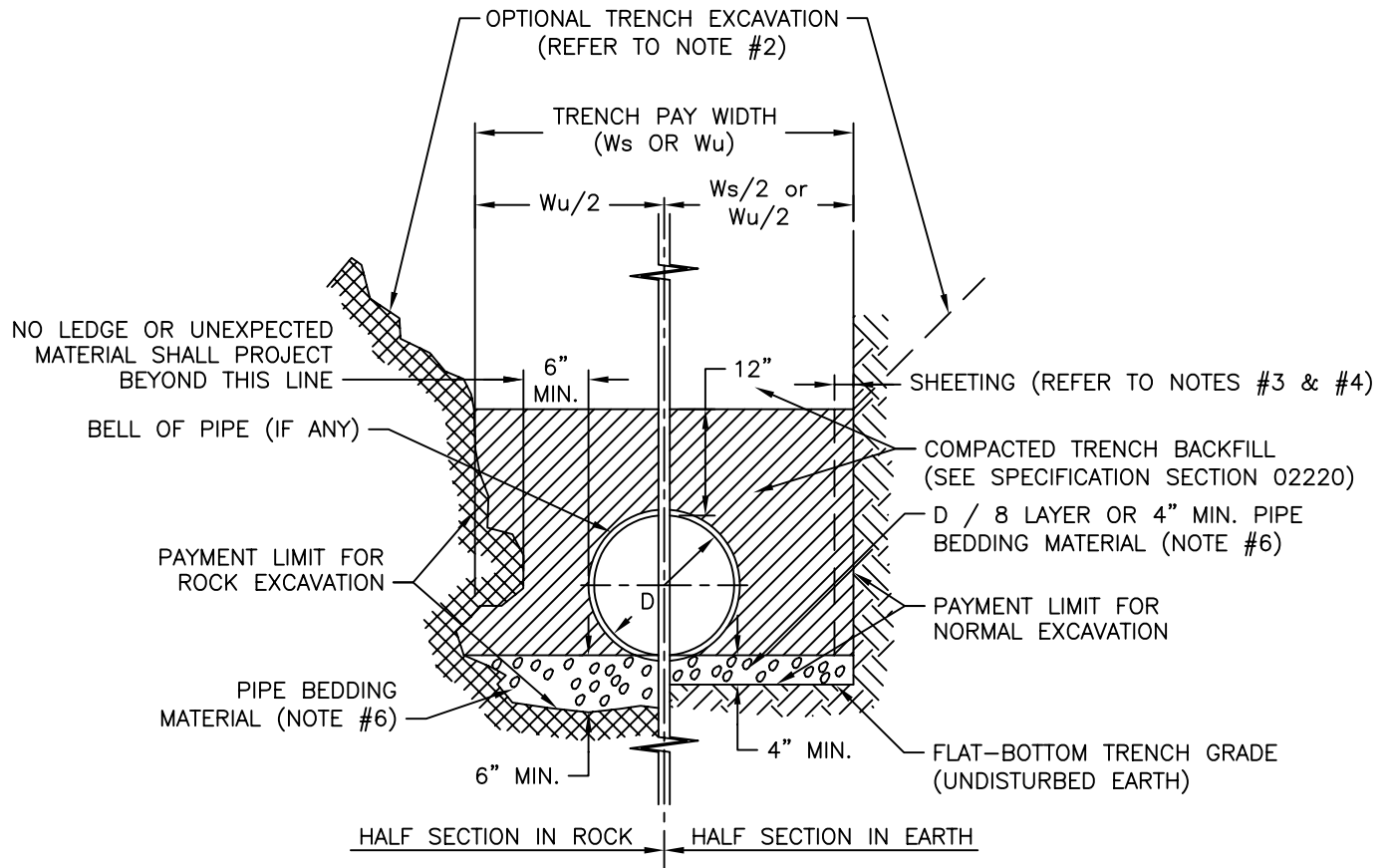
1. PIPE LAYING CONDITION TYPE 3A (TRENCH INSTALLATION) SHALL BE USED FOR DUCTILE IRON PIPE SEWER CONSTRUCTION ONLY WHEN SPECIFIED OR SHOWN ON DRAWINGS.
2. TRENCHES MAY BE EXCAVATED WIDER THAN THE TRENCH PAY WIDTH (Ws OR Wu) ABOVE A LINE 1'-0" FROM TOP OF PIPE, AT CONTRACTOR'S OPTION AND AT NO ADDITIONAL COST TO THE AUTHORITY.
3. IF EXCAVATION TO A DEPTH GREATER THAN 4.5 FEET IS REQUIRED, EXCAVATION SUPPORT SHEETING MAY BE ORDERED OR TRENCH SHIELDS UTILIZED AT CONTRACTORS OPTION. COSTS UNDER THIS OPTION SHALL BE PART OF THE UNIT PRICE BID FOR EXCAVATION.
4. SHEETING, IF USED, SHALL BE REMOVED IN CONJUNCTION WITH THE BACKFILLING OPERATION UNLESS OTHERWISE SPECIFIED OR SHOWN ON DRAWINGS. HOWEVER, IF APPROVED IN WRITING, SHEETING MAY BE CUT-OFF AND LEFT IN PLACE BELOW A LINE 1'-0" ABOVE THE TOP OF PIPE OR AS DIRECTED BY THE ENGINEER.

APPROVED DATE: June 20, 2003

DIRECTOR, DEPARTMENT OF ENGINEERING
 AND TECHNICAL SERVICES

REVISION NO.: 0
 DATE: 6/20/03
 PREPARED BY: OBG/BKJV
 CHECKED BY: W.DARROW

STANDARD DETAIL
 DUCTILE IRON SEWER
 PIPE LAYING CONDITION TYPE 3A
 (TRENCH INSTALLATION)



APPROVED DATE: June 20, 2003

DIRECTOR, DEPARTMENT OF ENGINEERING
 AND TECHNICAL SERVICES

REVISION NO.: 0
 DATE: 6/20/03
 PREPARED BY: OBG/BKJV
 CHECKED BY: W.DARROW

STANDARD DETAIL
 DUCTILE IRON SEWER
 PIPE LAYING CONDITION TYPE 4A
 (TRENCH INSTALLATION)

PIPE DIAMETER D	TRENCH PAY WIDTH (Ws or Wu)	
	UNSHEETED (Wu)	SHEETED (Ws)
8"	2' - 4"	2' - 10"
12"	2' - 8"	3' - 2"
16"	3' - 0"	3' - 6"
20"	3' - 4"	3' - 10"
24"	3' - 8"	4' - 2"
30"	4' - 2"	4' - 8"
36"	5' - 7"	6' - 1"
42"	6' - 1"	6' - 7"
48"	6' - 7"	7' - 1"

NOTES:

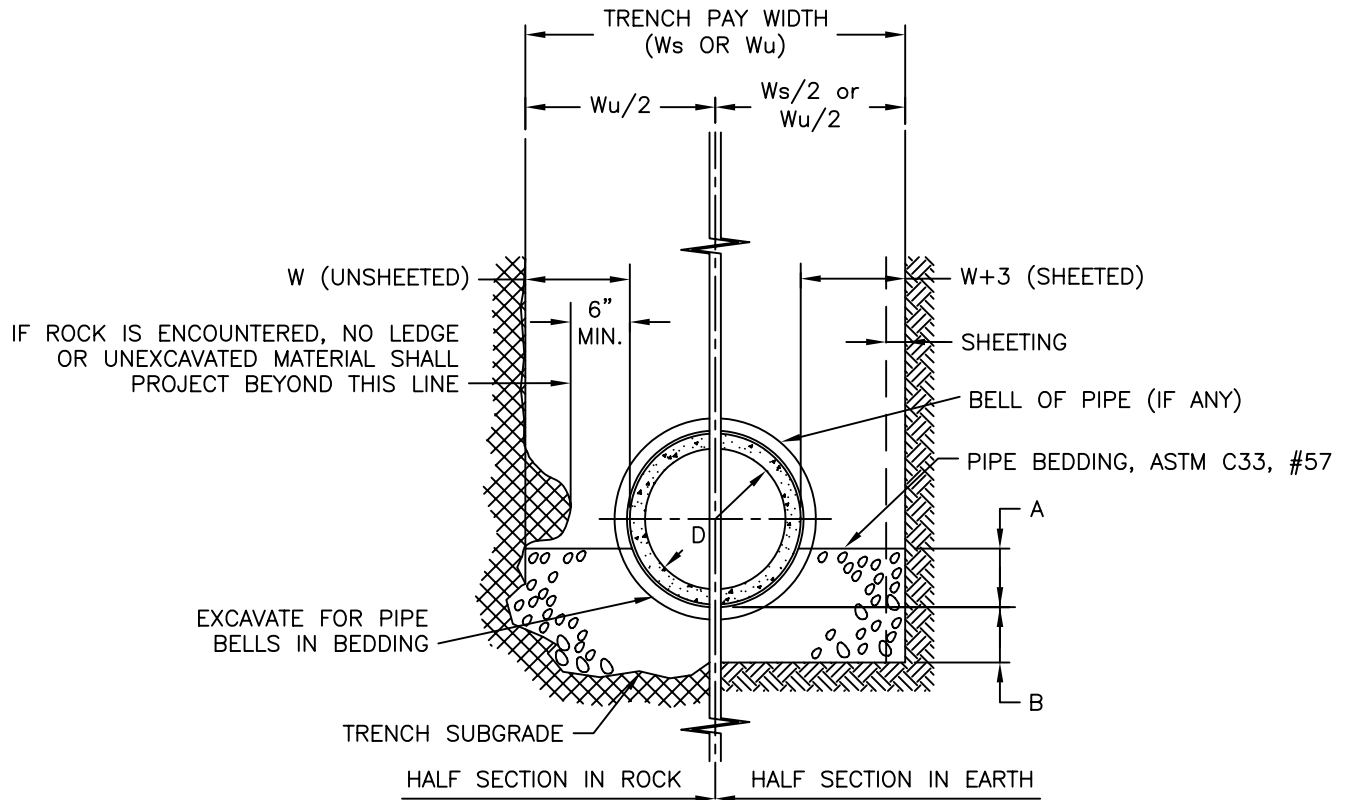
1. PIPE LAYING CONDITION TYPE 4A (TRENCH INSTALLATION) SHALL BE USED FOR DUCTILE IRON PIPE SEWER CONSTRUCTION ONLY WHEN SPECIFIED OR SHOWN ON DRAWINGS.
2. TRENCHES MAY BE EXCAVATED WIDER THAN THE TRENCH PAY WIDTH (Ws OR Wu) ABOVE A LINE 1'-0" FROM TOP OF PIPE, AT CONTRACTOR'S OPTION AND AT NO ADDITIONAL COST TO THE AUTHORITY.
3. IF EXCAVATION TO A DEPTH GREATER THAN 4.5 FEET IS REQUIRED, EXCAVATION SUPPORT SHEETING MAY BE ORDERED OR TRENCH SHIELDS UTILIZED AT CONTRACTORS OPTION. COSTS UNDER THIS OPTION SHALL BE PART OF THE UNIT PRICE BID FOR EXCAVATION.
4. SHEETING, IF USED, SHALL BE REMOVED IN CONJUNCTION WITH THE BACKFILLING OPERATION UNLESS OTHERWISE SPECIFIED OR SHOWN ON DRAWINGS. HOWEVER, IF APPROVED IN WRITING, SHEETING MAY BE CUT-OFF AND LEFT IN PLACE BELOW A LINE 1'-0" ABOVE THE TOP OF PIPE OR AS DIRECTED BY THE ENGINEER.
5. COMPACTED TRENCH BACKFILL, 80 % BETWEEN PIPE BEDDING AND 12 INCHES ABOVE TOP OF PIPE.
6. PIPE BEDDING MATERIAL SHALL BE GRAVEL OR CRUSHED STONE CONFORMING TO ASTM C-33, GRADING SIZE NO. 67 OR NO. 57.

APPROVED DATE: June 20, 2003

DIRECTOR, DEPARTMENT OF ENGINEERING
AND TECHNICAL SERVICES

REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL
DUCTILE IRON SEWER
PIPE LAYING CONDITION TYPE 4A
(TRENCH INSTALLATION)



APPROVED DATE: June 20, 2003

DIRECTOR, DEPARTMENT OF ENGINEERING
 AND TECHNICAL SERVICES

REVISION NO.: 0
 DATE: 6/20/03
 PREPARED BY: OBG/BKJV
 CHECKED BY: W.DARROW

STANDARD DETAIL
 CONCRETE PIPE SEWER
 TRENCH LAYING CONDITION

PIPE DIAMETER D	PIPE BEDDING DIMENSION				TRENCH PAY WIDTH	
	W	A	B		UNSHEETED W _u	SHEETED W _s
			IN SOIL	IN ROCK		
12"	12"	5"	3"	6"	3' - 4"	3' - 10"
15"	12"	5"	3"	6"	3' - 7"	4' - 1"
18"	12"	6"	3"	6"	3' - 11"	4' - 5"
21"	12"	7"	3"	6"	4' - 3"	4' - 9"
24"	12"	8"	3"	6"	4' - 6"	5' - 0"
27"	18"	8"	3"	6"	5' - 9"	6' - 3"
30"	18"	9"	4"	9"	6' - 1"	6' - 7"
33"	18"	10"	4"	9"	6' - 5"	6' - 11"
36"	18"	10"	4"	9"	6' - 8"	7' - 2"
42"	18"	13"	4"	9"	7' - 3"	7' - 9"
48"	24"	15"	4"	9"	8' - 10"	9' - 4"
54"	24"	16"	4"	9"	9' - 5"	9' - 11"
60"	24"	18"	4"	9"	10' - 0"	10' - 6"
66"	24"	20"	6"	12"	10' - 7"	11' - 1"
72"	24"	22"	6"	12"	11' - 2"	11' - 8"
78"	24"	23"	6"	12"	11' - 9"	12' - 3"
84"	24"	25"	6"	12"	12' - 4"	12' - 10"
90"	24"	27"	6"	12"	12' - 11"	13' - 5"
96"	24"	28"	6"	12"	13' - 6"	14' - 0"
102"	24"	30"	6"	12"	14' - 1"	14' - 7"
108"	24"	32"	6"	12"	14' - 8"	15' - 2"

NOTES:

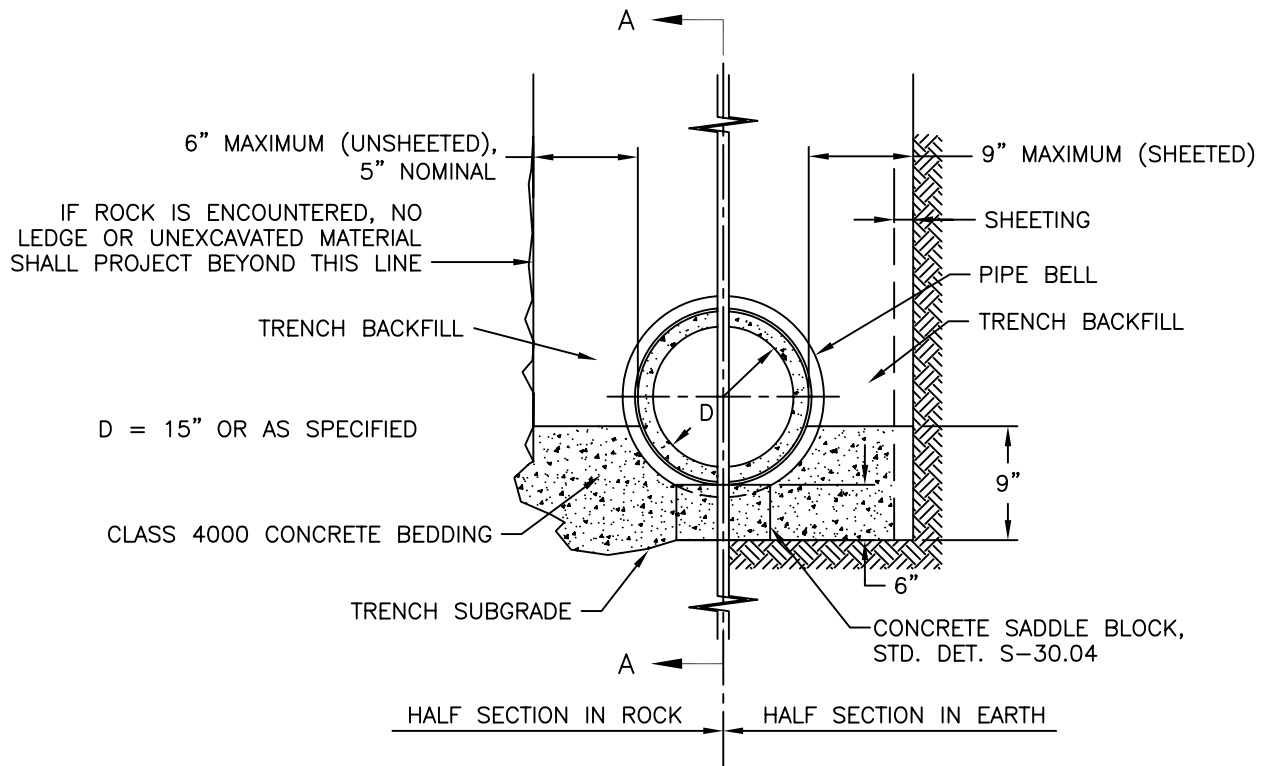
1. IF NECESSARY TO EXCEED W BELOW A HORIZONTAL PLANE 1'-0" ABOVE TOP OF PIPE, SEE SPECIFICATION SECTION 02220.
2. SHEETING, IF USED, SHALL BE REMOVED IN CONJUNCTION WITH THE BACKFILLING OPERATION UNLESS OTHERWISE SPECIFIED OR SHOWN ON DRAWING. HOWEVER, IF APPROVED IN WRITING, SHEETING MAY BE CUT-OFF AND LEFT IN PLACE BELOW A LINE 1'-0" ABOVE THE TOP OF THE PIPE OR AS DIRECTED BY THE ENGINEER.

APPROVED DATE: June 20, 2003

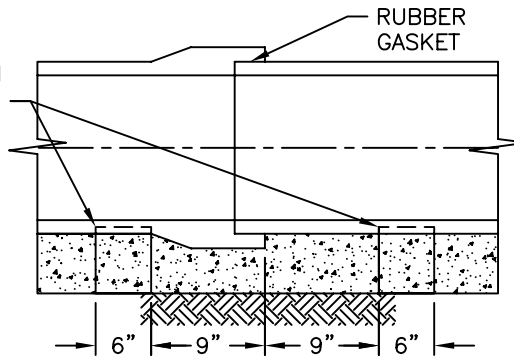
DIRECTOR, DEPARTMENT OF ENGINEERING
AND TECHNICAL SERVICES

REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL
CONCRETE PIPE SEWER
TRENCH LAYING CONDITION



SADDLE BLOCKS - 2 PER STANDARD PIPE LENGTH, NOT REQUIRED AT PIPE ENTRY TO BASIN AND MANHOLE IF PIPE IS INSTALLED AFTER BASIN AND/OR SEWER MANHOLE



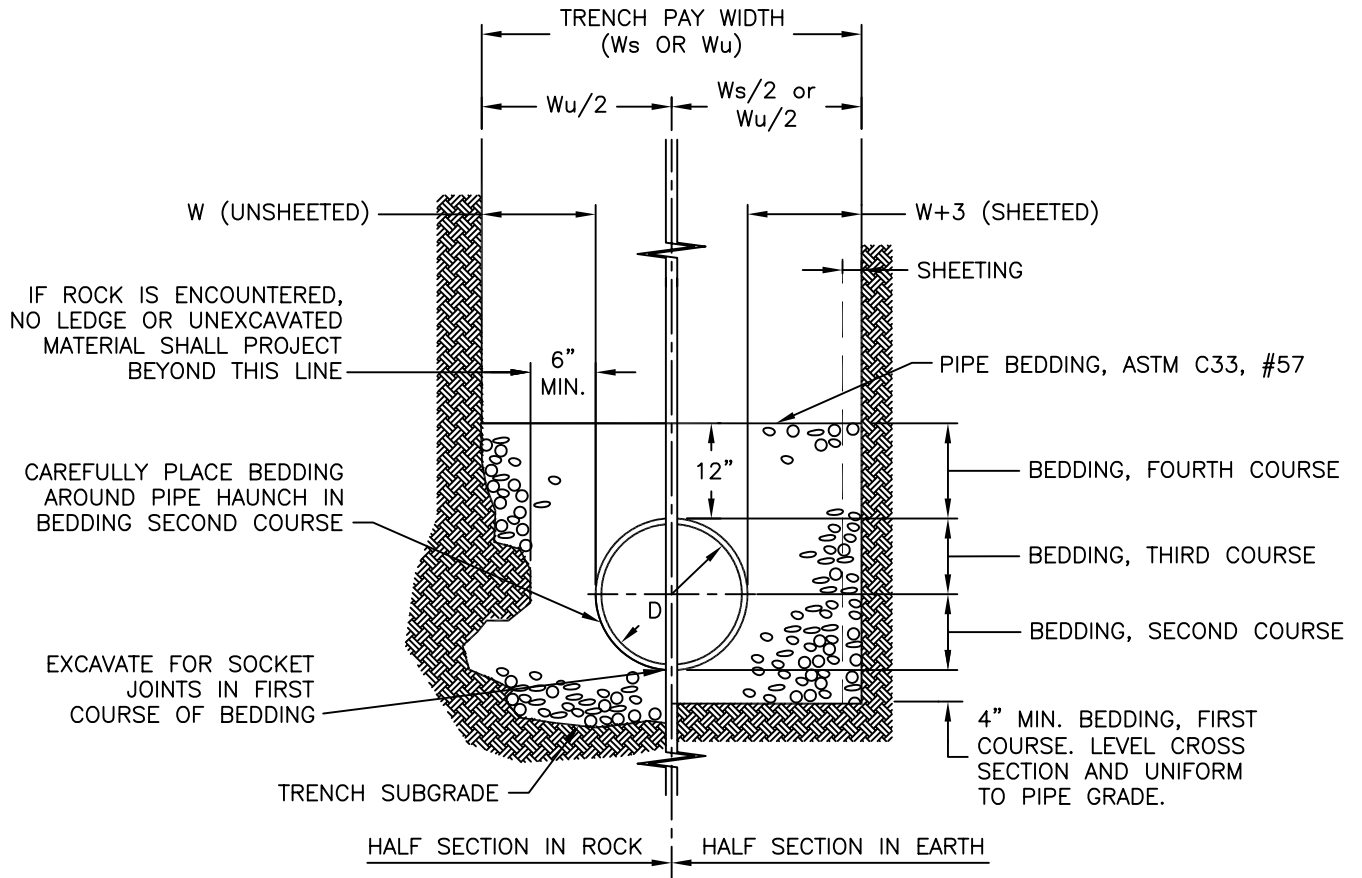
SECTION A - A

APPROVED DATE: June 20, 2003

DIRECTOR, DEPARTMENT OF ENGINEERING
AND TECHNICAL SERVICES

REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL
CATCH BASIN CONNECTION PIPE
TRENCH LAYING CONDITION



TRENCH PAY WIDTH (Ws OR Wu)			
PIPE DIAMETER D	TRENCH WIDTH CLEAR W	TRENCH PAY WIDTH	
		Wu	Ws
10"	12"	2'-11"	3'-5"
12"	12"	3'-0"	3'-6"
15"	12"	3'-3"	3'-9"
18"	12"	3'-7"	4'-1"
21"	12"	3'-10"	4'-4"
24"	12"	4'-1"	4'-7"
27"	12"	5'-4"	5'-10"

NOTES:

1. IF NECESSARY TO EXCEED W BELOW A HORIZONTAL PLANE 1'-0" ABOVE TOP OF PIPE, SEE SPECIFICATION SECTION 02220.
2. SHEETING, IF USED, SHALL BE REMOVED IN CONJUNCTION WITH THE BACKFILLING OPERATION UNLESS OTHERWISE SPECIFIED OR SHOWN ON DRAWING.

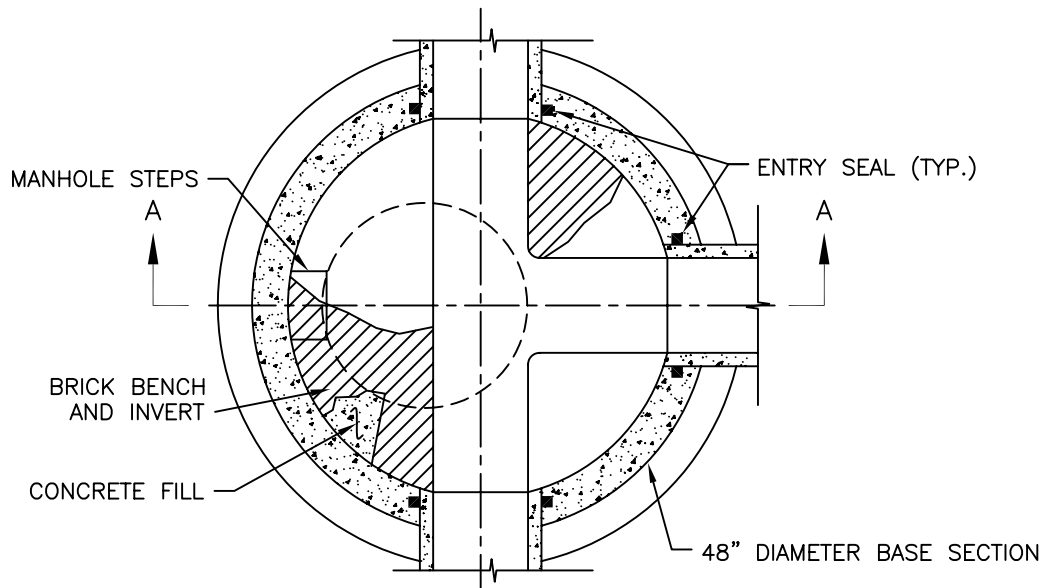
APPROVED DATE: June 20, 2003

DIRECTOR, DEPARTMENT OF ENGINEERING
AND TECHNICAL SERVICES

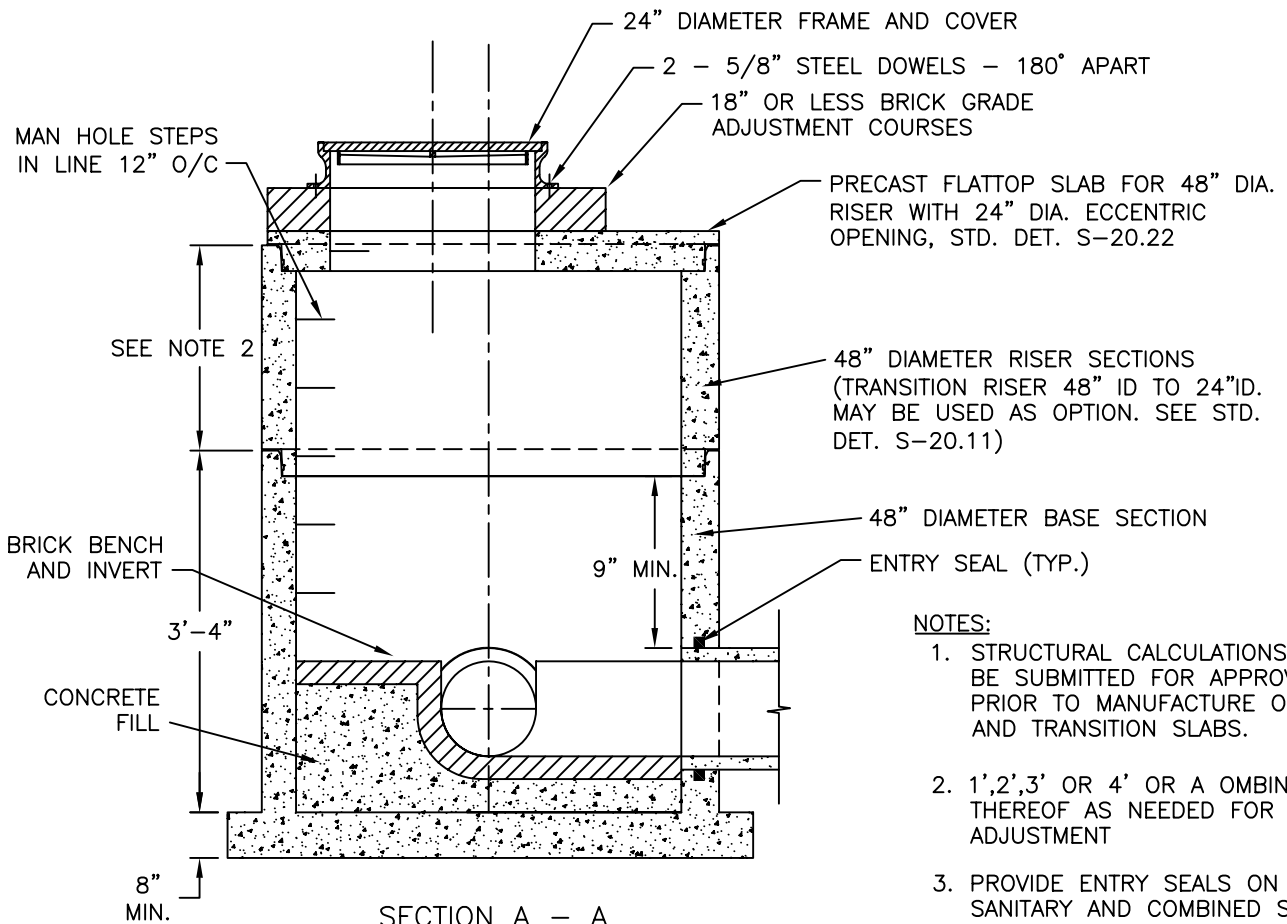
REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL

POLYVINYL CHLORIDE (PVC) PIPE SEWER
TRENCH LAYING CONDITION



SECTIONAL PLAN



NOTES:

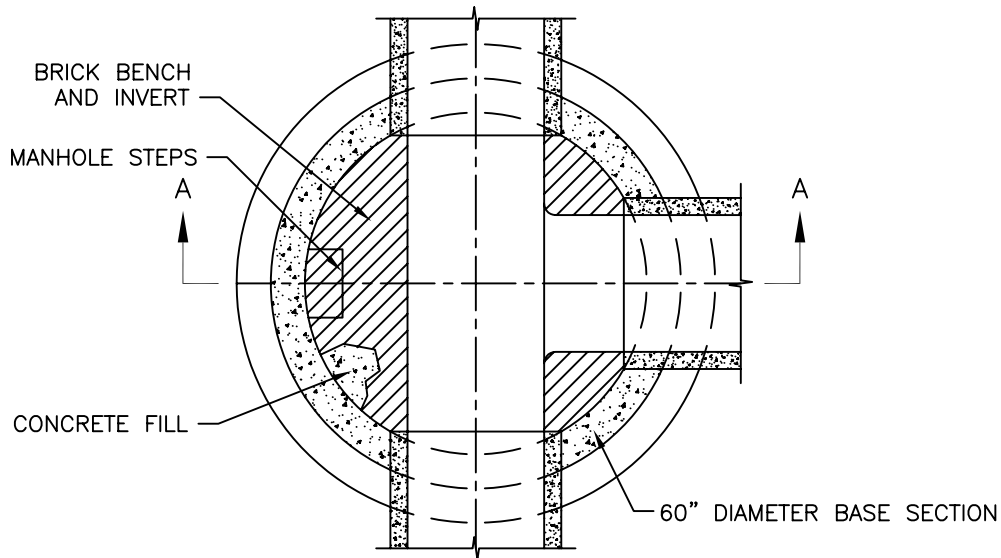
1. STRUCTURAL CALCULATIONS MUST BE SUBMITTED FOR APPROVAL PRIOR TO MANUFACTURE OF BASE AND TRANSITION SLABS.
2. 1', 2', 3' OR 4' OR A COMBINATION THEREOF AS NEEDED FOR GRADE ADJUSTMENT
3. PROVIDE ENTRY SEALS ON SANITARY AND COMBINED SEWER CONNECTIONS 24" AND SMALLER.

APPROVED DATE: June 20, 2003

DIRECTOR, DEPARTMENT OF ENGINEERING
AND TECHNICAL SERVICES

REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL
PRECAST CONCRETE MANHOLE
FOR NEW 10" THRU 21" DIAMETER SEWERS
(48" DIAMETER PRECAST BASE)



SECTIONAL PLAN

15' OR LESS TO INVERT
24" DIA. COVER WITH
36" X 24" DIA. ADAPTER RING

GREATER THAN 15' DEPTH
36" DIAMETER COVER

FOR DETAIL SEE
STD. DET. S-20.20

SEE
NOTE 2

MAN HOLE STEPS
IN LINE 12" O/C

BRICK BENCH
AND INVERT

5'-0"

CONCRETE FILL

8"
MIN.

36" DIAMETER FRAME

2 - 5/8" STEEL DOWELS - 180° APART

18" OR LESS BRICK GRADE
ADJUSTMENT COURSES

PRECAST FLATTOP SLAB FOR 48" DIA.
RISER WITH 36" DIA. ECCENTRIC
OPENING, STD. DET. S-20.23

48" DIAMETER RISER SECTIONS
(TRANSITION RISER 48" ID TO 24" ID.
MAY BE USED AS OPTION. SEE STD.
DET. S-20.11)

PRECAST SLAB FOR 60" DIA. RISER
WITH 48" DIA. ECCENTRIC OPENING,
STD. DET. S-20.24

60" DIAMETER BASE SECTION

9"
MIN.

NOTES:

1. STRUCTURAL CALCULATIONS MUST BE SUBMITTED FOR APPROVAL PRIOR TO MANUFACTURE OF BASE AND TRANSITION SLABS.
2. 1', 2', 3' OR 4' OR A COMBINATION THEREOF AS NEEDED FOR GRADE ADJUSTMENT
3. PROVIDE ENTRY SEALS ON SANITARY AND COMBINED SEWER CONNECTIONS 24" AND SMALLER.

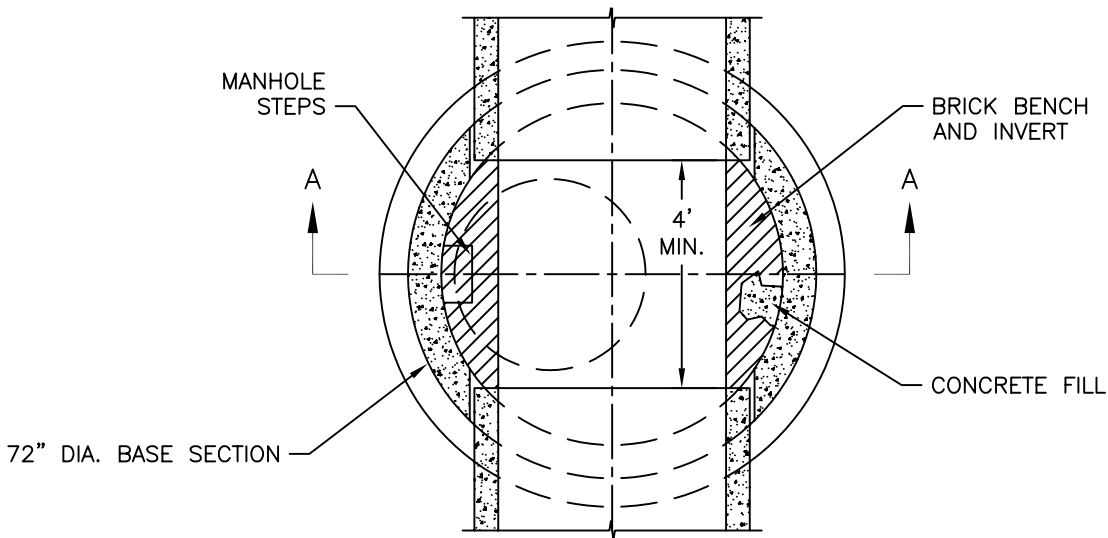
SECTION A - A

APPROVED DATE: June 20, 2003

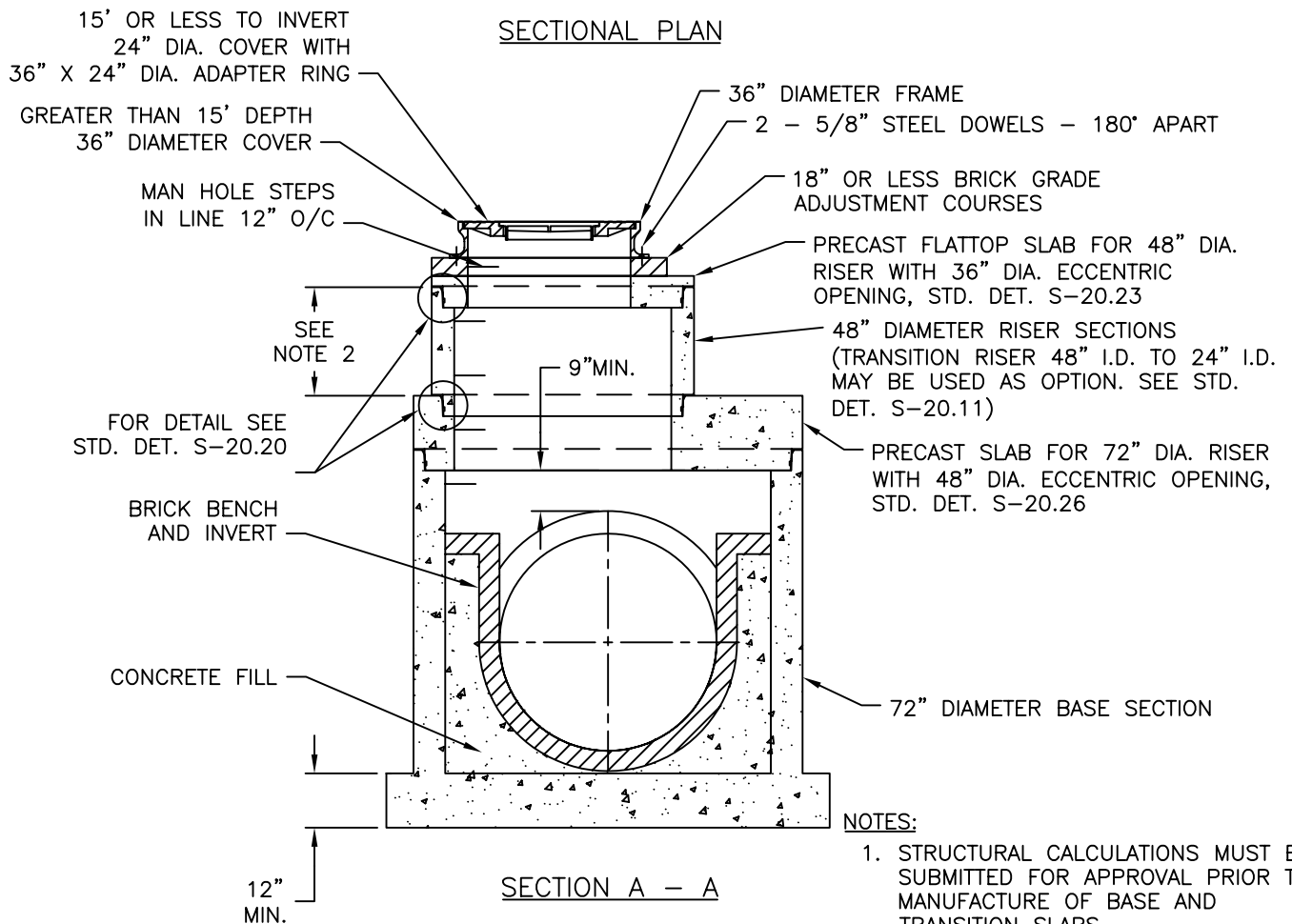
DIRECTOR, DEPARTMENT OF ENGINEERING
AND TECHNICAL SERVICES

REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL
PRECAST CONCRETE MANHOLE
FOR NEW 24" THRU 30" DIAMETER SEWERS
(60" DIAMETER PRECAST BASE)



SECTIONAL PLAN



NOTES:

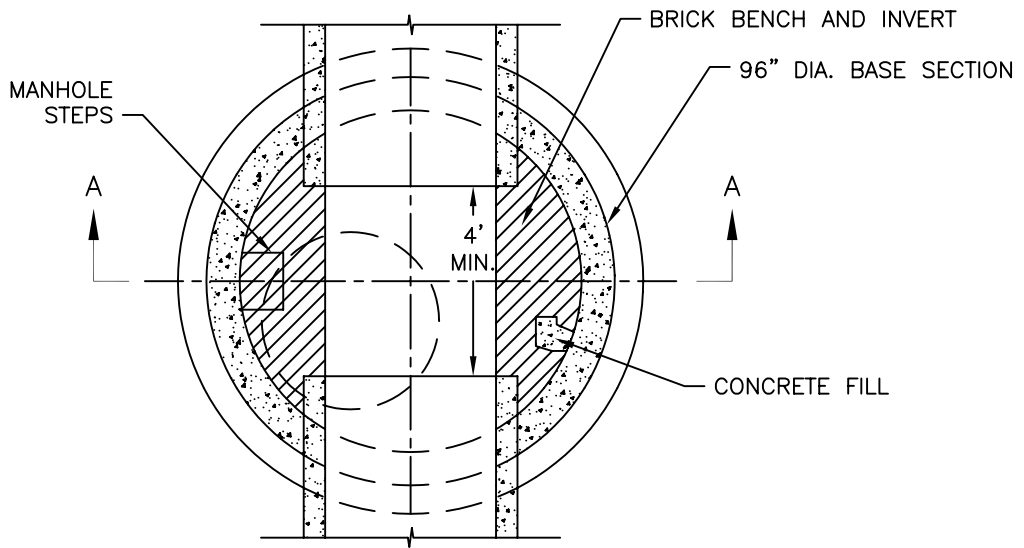
1. STRUCTURAL CALCULATIONS MUST BE SUBMITTED FOR APPROVAL PRIOR TO MANUFACTURE OF BASE AND TRANSITION SLABS.
2. 1', 2', 3' OR 4' OR A COMBINATION THEREOF AS NEEDED FOR GRADE ADJUSTMENT

APPROVED DATE: June 20, 2003

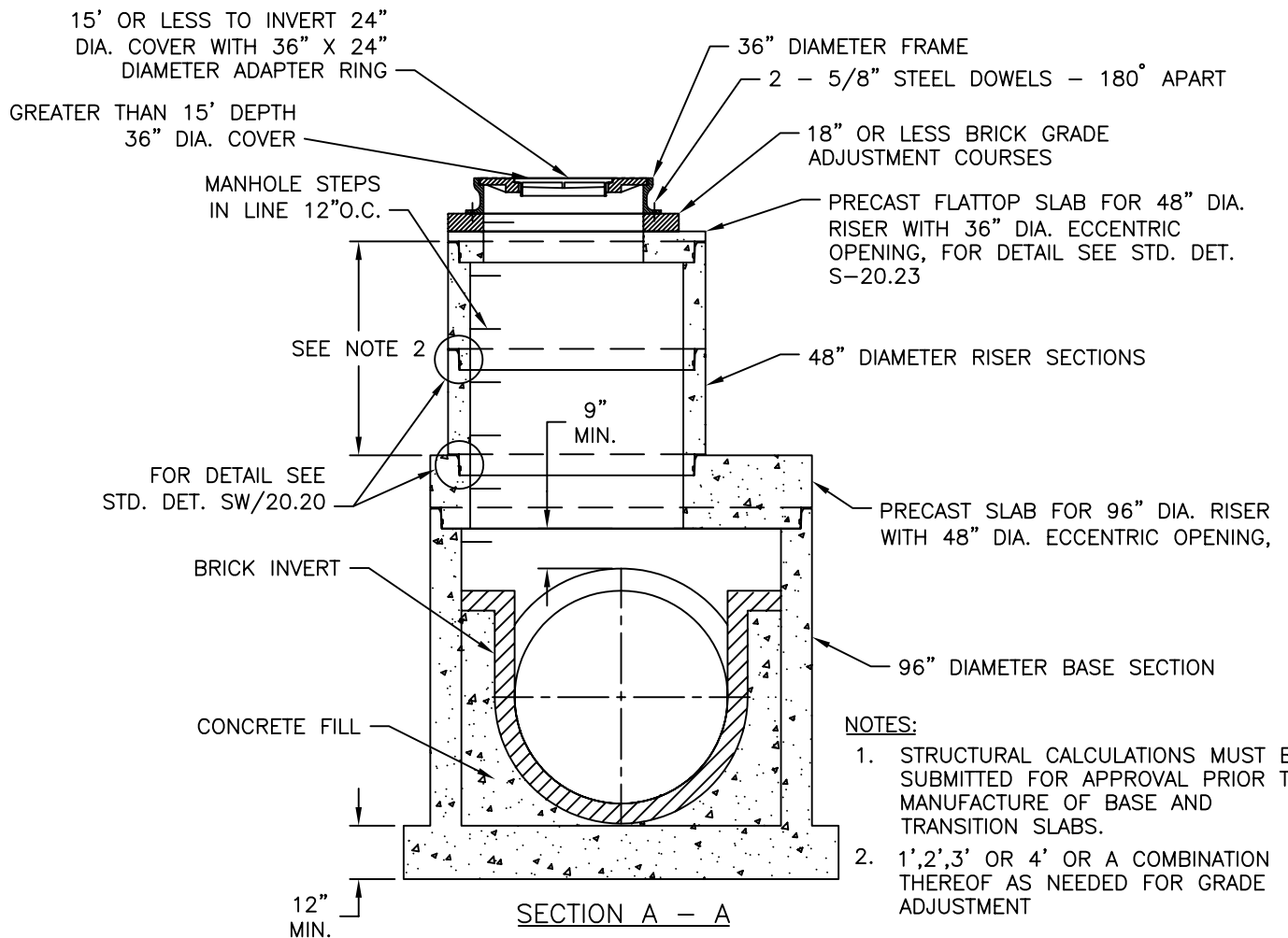
DIRECTOR, DEPARTMENT OF ENGINEERING
AND TECHNICAL SERVICES

REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: O.BG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL
PRECAST CONCRETE MANHOLE
FOR NEW 33" THRU 48" DIAMETER SEWERS
(72" DIAMETER PRECAST BASE)



SECTIONAL PLAN



NOTES:

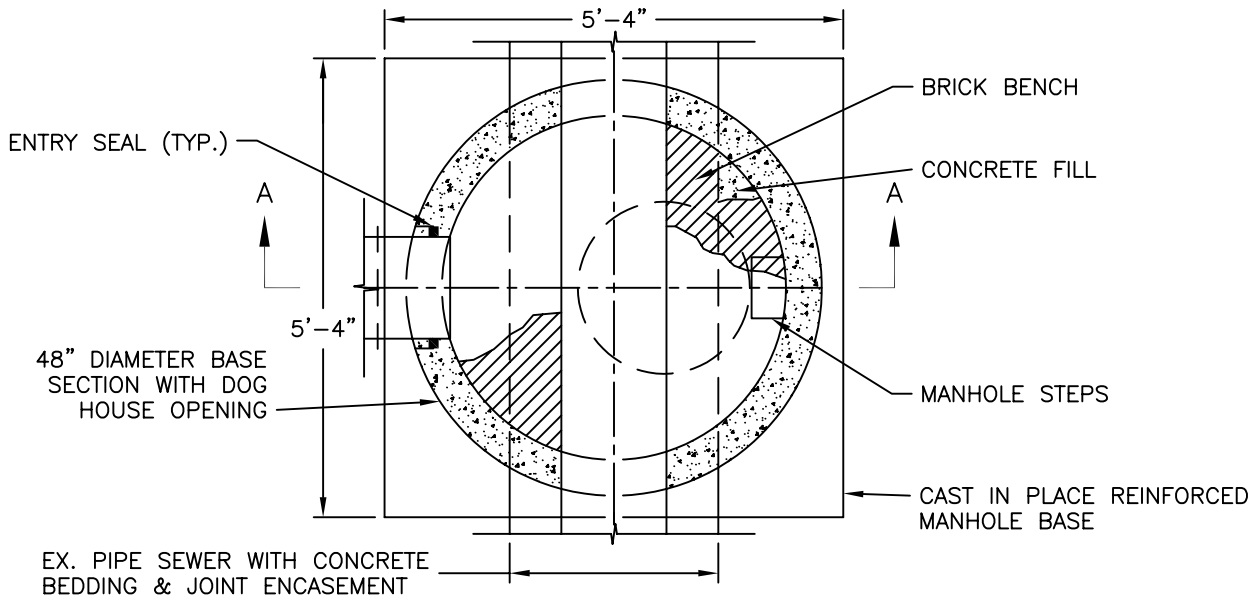
1. STRUCTURAL CALCULATIONS MUST BE SUBMITTED FOR APPROVAL PRIOR TO MANUFACTURE OF BASE AND TRANSITION SLABS.
2. 1', 2', 3' OR 4' OR A COMBINATION THEREOF AS NEEDED FOR GRADE ADJUSTMENT

APPROVED DATE: June 20, 2003

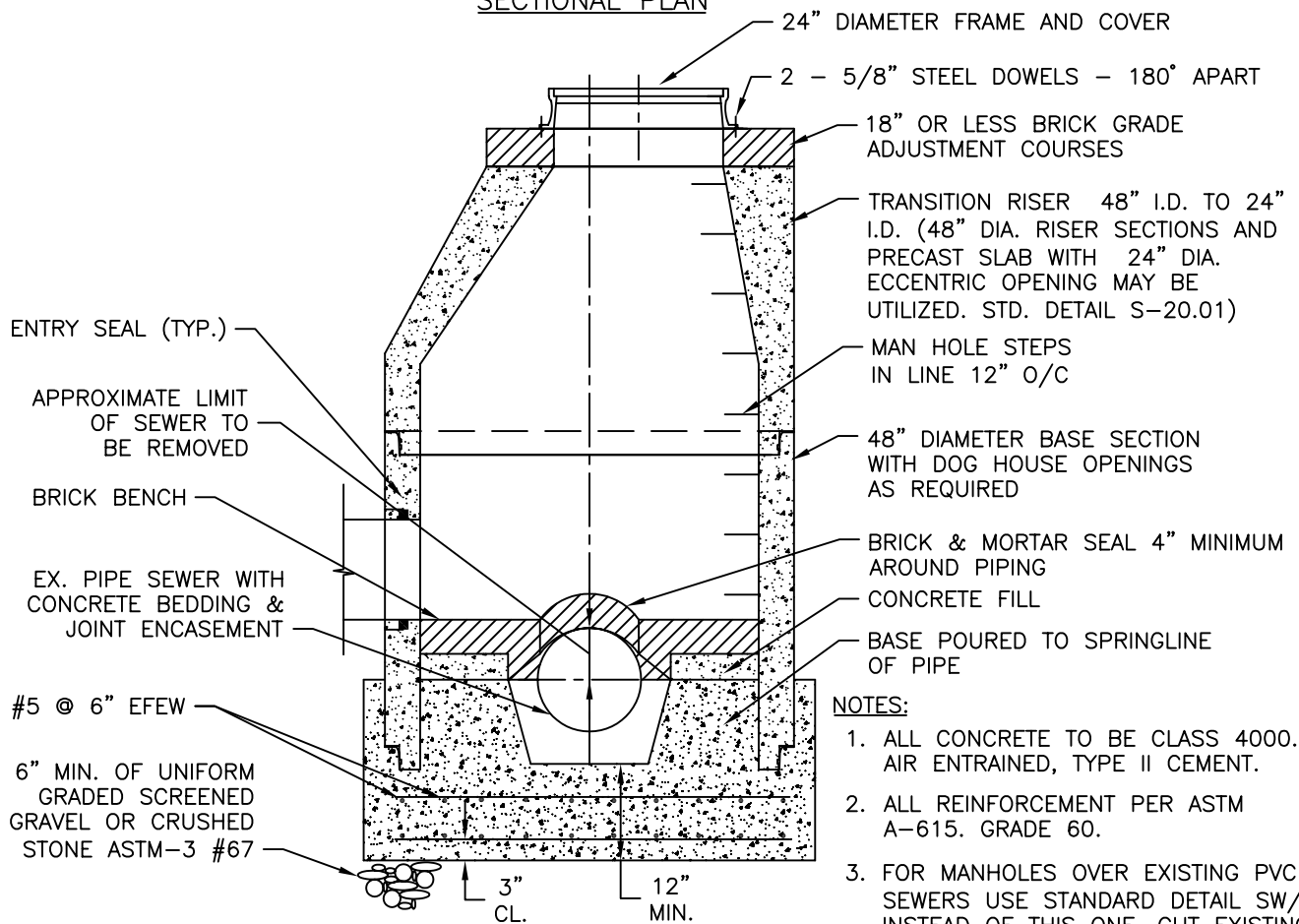
DIRECTOR, DEPARTMENT OF ENGINEERING AND TECHNICAL SERVICES

REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL
PRECAST CONCRETE MANHOLE
FOR NEW 54" THRU 60" DIAMETER SEWERS
(96" DIAMETER PRECAST BASE)



SECTIONAL PLAN



SECTION A - A

NOTES:

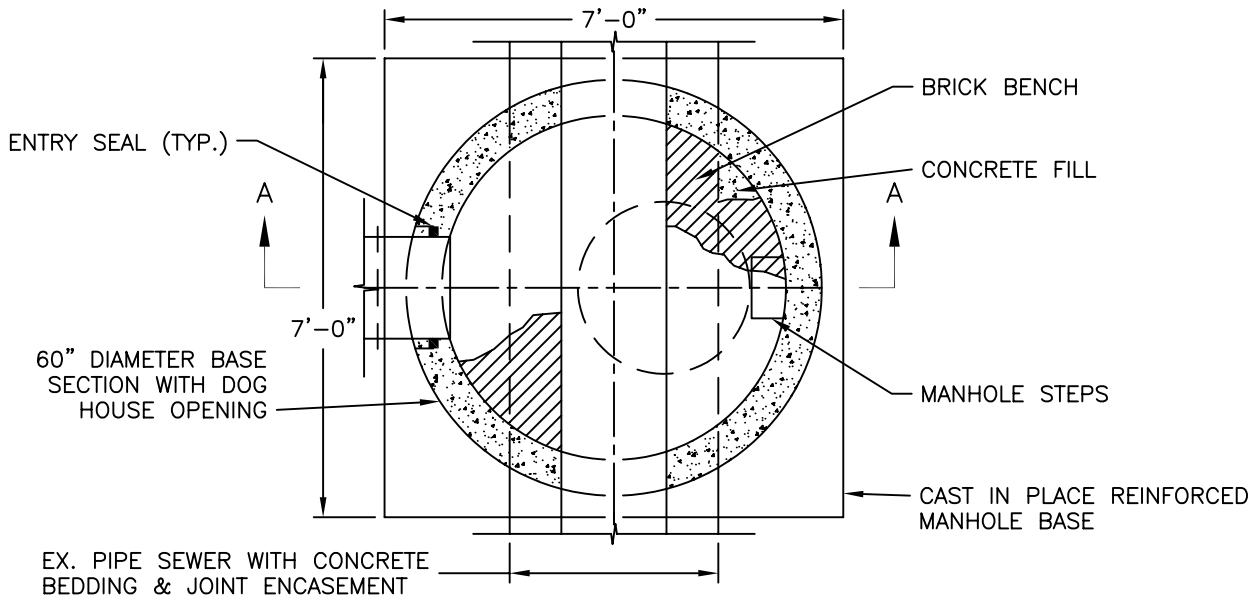
1. ALL CONCRETE TO BE CLASS 4000. AIR ENTRAINED, TYPE II CEMENT.
2. ALL REINFORCEMENT PER ASTM A-615. GRADE 60.
3. FOR MANHOLES OVER EXISTING PVC SEWERS USE STANDARD DETAIL SW/20.01 INSTEAD OF THIS ONE. CUT EXISTING PVC SEWER AND RECONNECT ON EITHER SIDE OF MANHOLE

APPROVED DATE: June 20, 2003

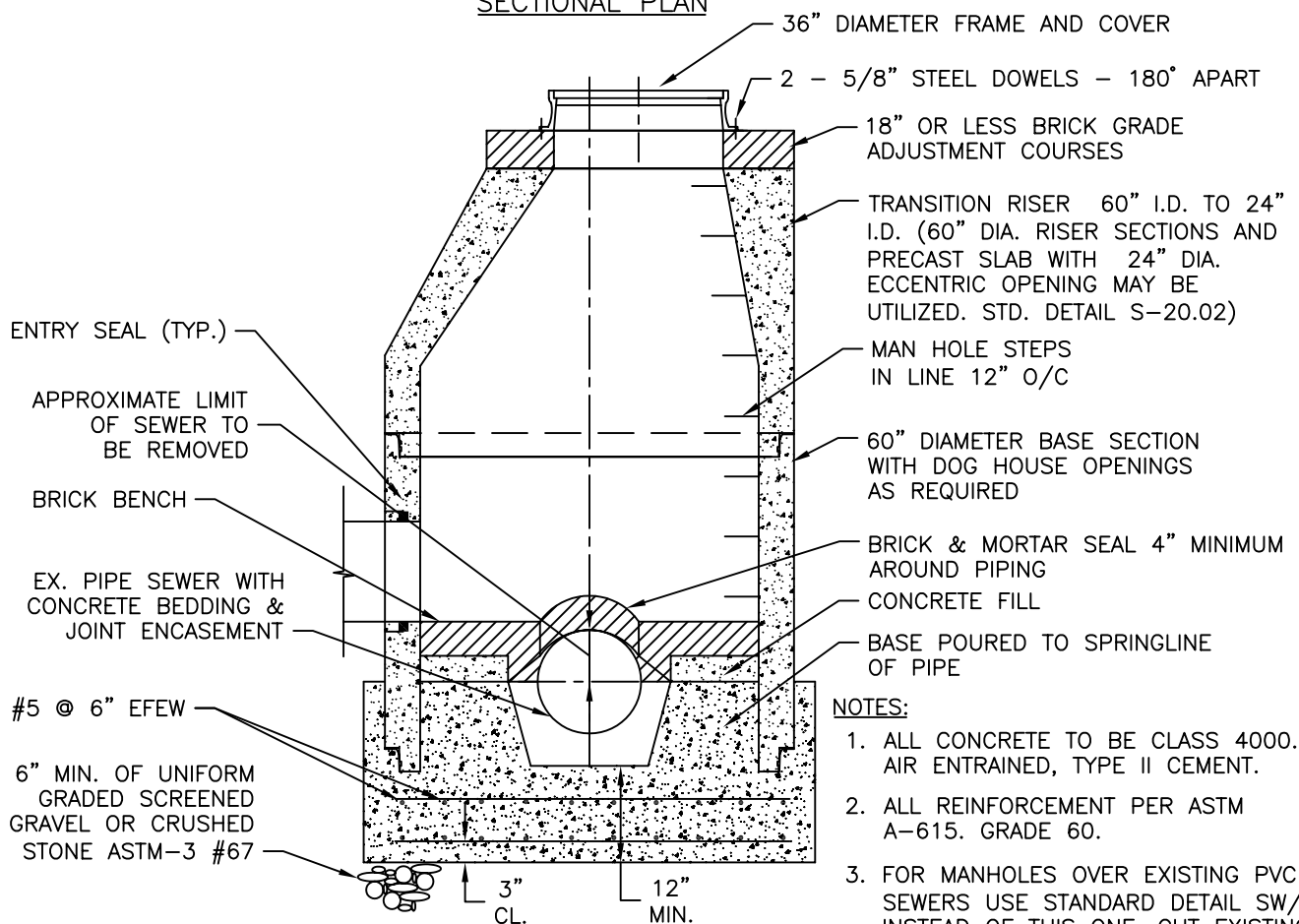
DIRECTOR, DEPARTMENT OF ENGINEERING AND TECHNICAL SERVICES

REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL
PRECAST CONCRETE MANHOLE OVER EXISTING
10" THRU 21" DIAMETER SEWERS WITH
CAST IN PLACE CONCRETE BASE



SECTIONAL PLAN



SECTION A - A

NOTES:

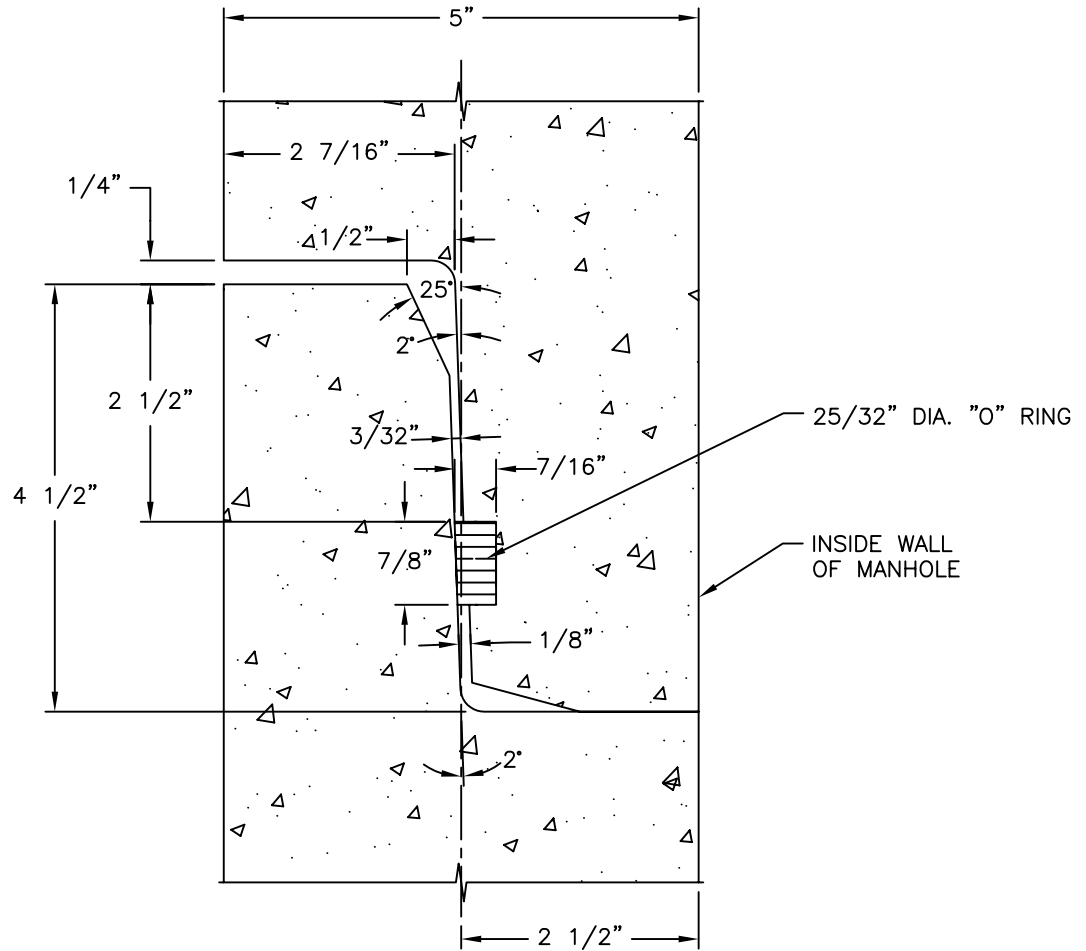
1. ALL CONCRETE TO BE CLASS 4000. AIR ENTRAINED, TYPE II CEMENT.
2. ALL REINFORCEMENT PER ASTM A-615. GRADE 60.
3. FOR MANHOLES OVER EXISTING PVC SEWERS USE STANDARD DETAIL SW/20.02 INSTEAD OF THIS ONE. CUT EXISTING PVC SEWER AND RECONNECT ON EITHER SIDE OF MANHOLE

APPROVED DATE: June 20, 2003

DIRECTOR, DEPARTMENT OF ENGINEERING AND TECHNICAL SERVICES

REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL
PRECAST CONCRETE MANHOLE OVER EXISTING
24" THRU 30" DIAMETER SEWERS WITH
CAST IN PLACE CONCRETE BASE



JOINT DETAIL

NOTE:
FOR CLARITY, REINFORCING NOT SHOWN.

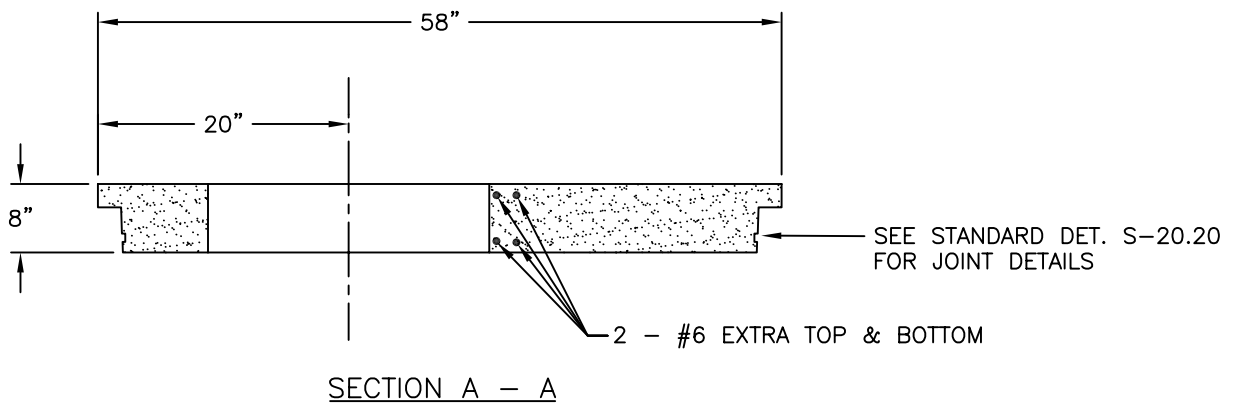
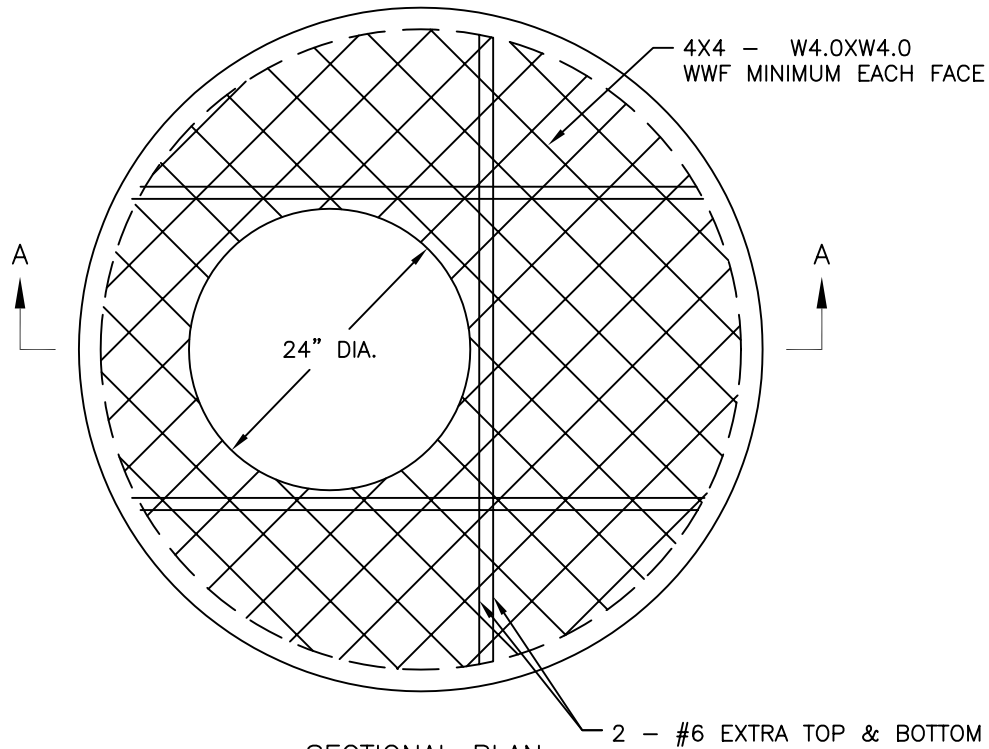
APPROVED DATE: June 20, 2003

DIRECTOR, DEPARTMENT OF ENGINEERING
AND TECHNICAL SERVICES

REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL

PIPE RISER JOINT DETAIL
(48" DIAMETER RISER)



NOTES:

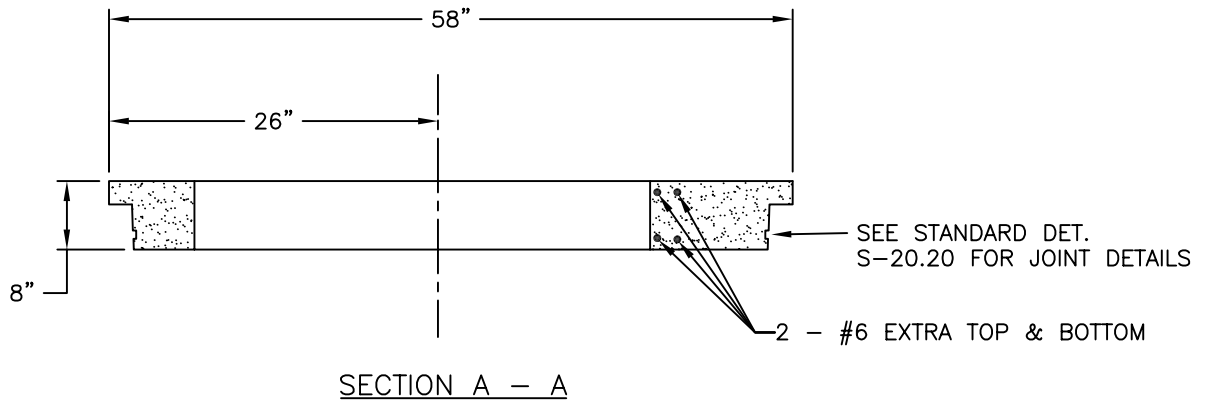
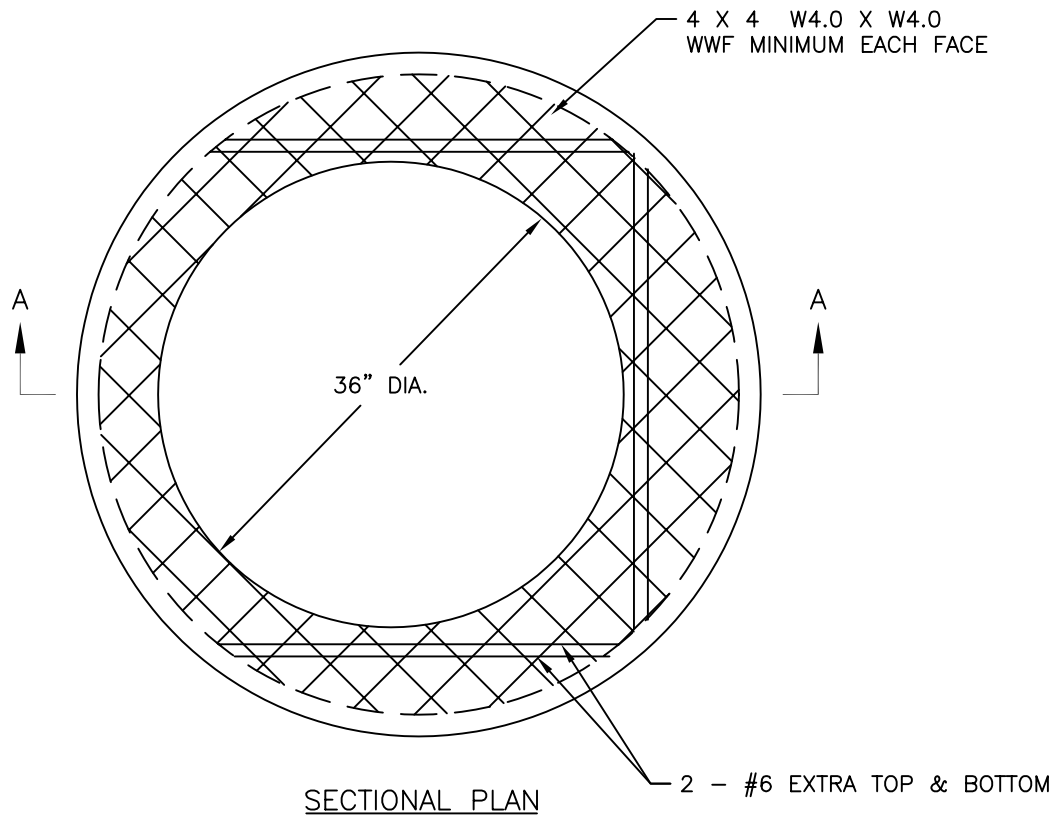
1. ALL CONCRETE TO BE CLASS 4000, AIR ENTRAINED, TYPE II CEMENT
2. REINFORCING STEEL SHALL CONFORM TO ASTM A615, GRADE 60
3. WWF PER ASTM A185

APPROVED DATE: June 20, 2003

DIRECTOR, DEPARTMENT OF ENGINEERING
AND TECHNICAL SERVICES

REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL
PRECAST FLATTOP SLAB
FOR 48" DIAMETER MANHOLE RISER
WITH 24" DIAMETER ECCENTRIC OPENING



NOTES:

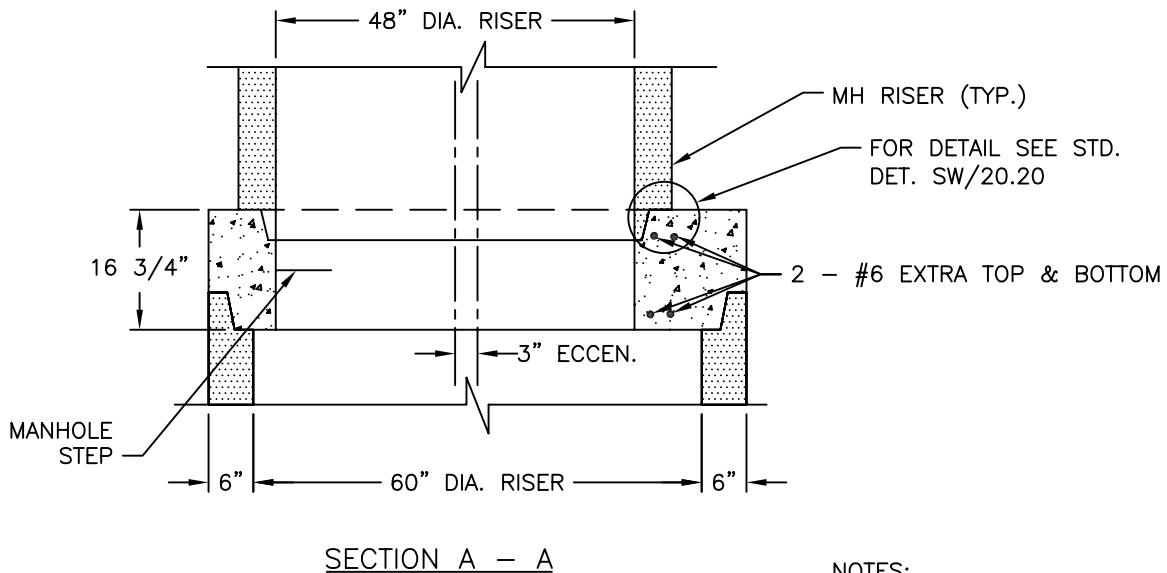
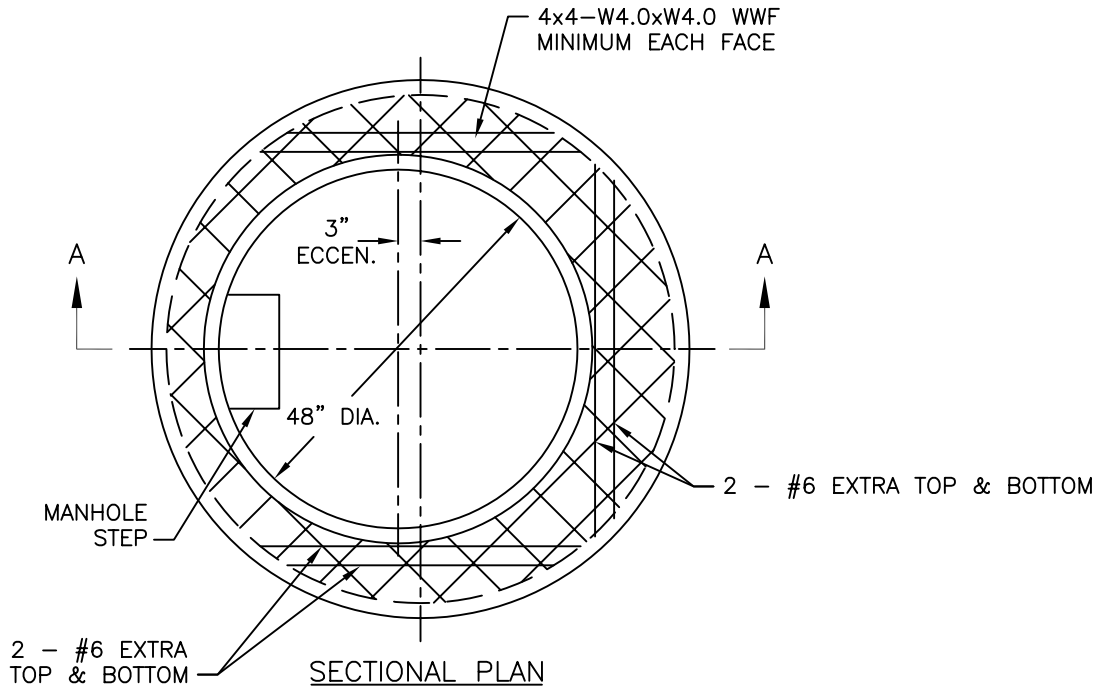
1. ALL CONCRETE TO BE CLASS 4000, AIR ENTRAINED, TYPE II CEMENT
2. REINFORCING STEEL SHALL CONFORM TO ASTM A615, GRADE 60
3. WWF PER ASTM A185

APPROVED DATE: June 20, 2003

DIRECTOR, DEPARTMENT OF ENGINEERING
AND TECHNICAL SERVICES

REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL
PRECAST FLATTOP SLAB
FOR 48" DIAMETER MANHOLE RISER
WITH 36" DIAMETER ECCENTRIC OPENING



NOTES:

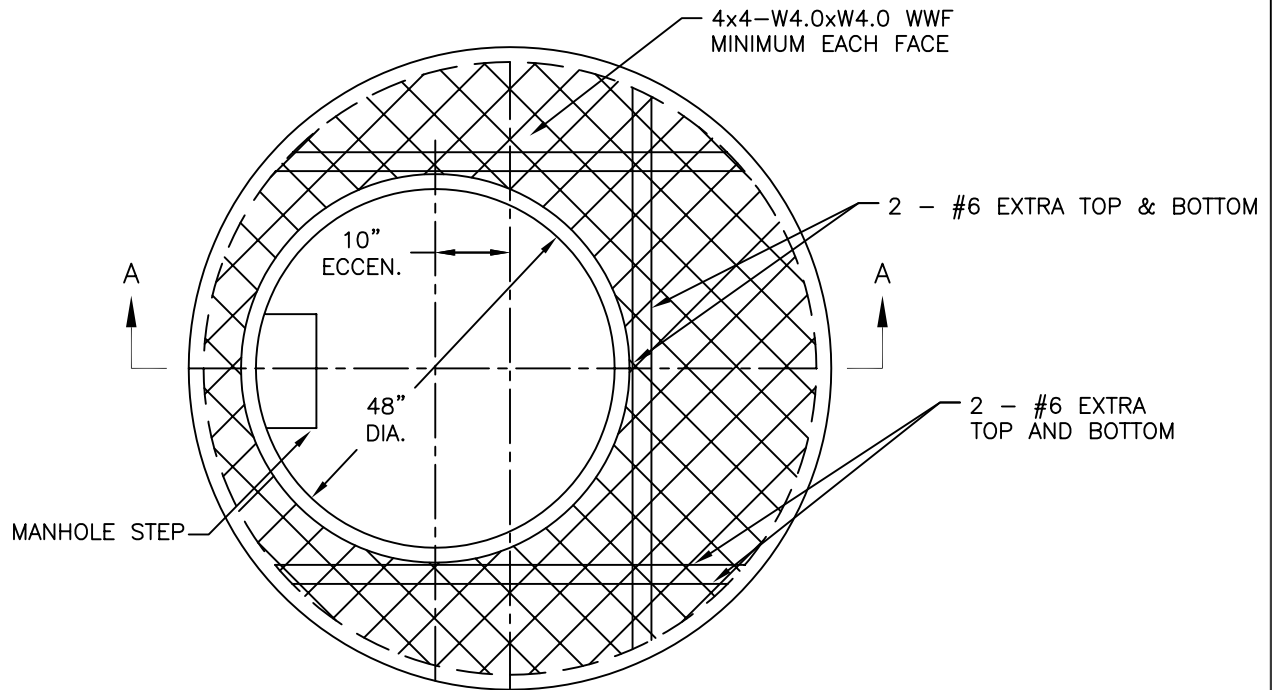
1. STRUCTURAL CALCULATIONS MUST BE SUBMITTED FOR APPROVAL PRIOR TO MANUFACTURE.
2. ALL CONCRETE TO BE CLASS 4000, AIR ENTRAINED, TYPE II CEMENT.
3. REINFORCING STEEL SHALL CONFORM TO ASTM A615, GRADE 60.
4. WWF PER ASTM A185

APPROVED DATE: June 20, 2003

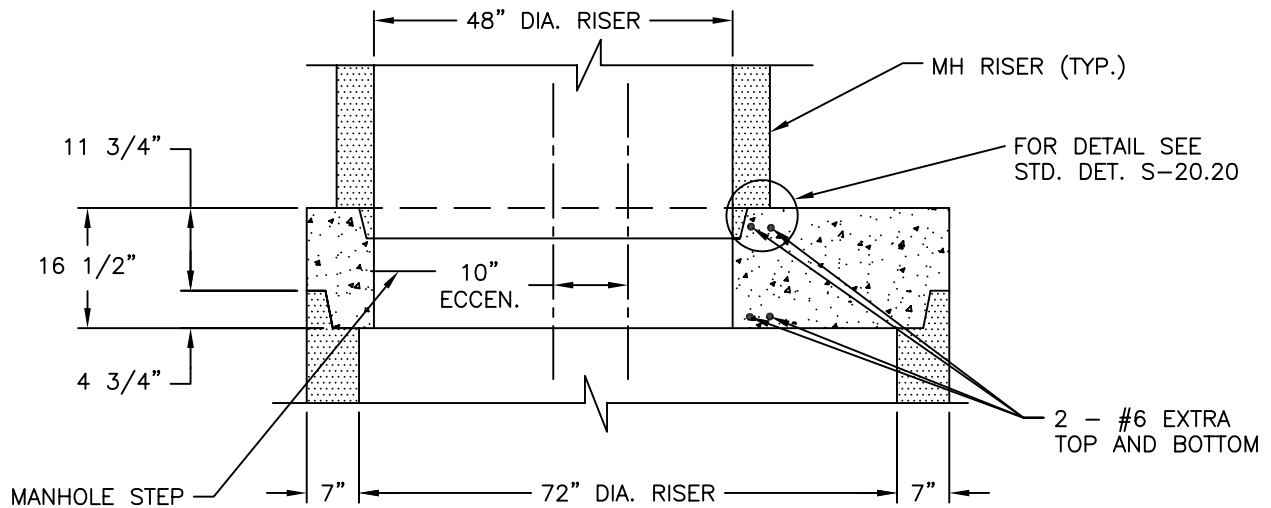
DIRECTOR, DEPARTMENT OF ENGINEERING
 AND TECHNICAL SERVICES

REVISION NO.: 0
 DATE: 6/20/03
 PREPARED BY: OBG/BKJV
 CHECKED BY: W.DARROW

STANDARD DETAIL
 PRECAST REDUCER SLAB
 FOR 60" DIAMETER MANHOLE RISER
 TO 48" DIAMETER ECCENTRIC RISER



SECTIONAL PLAN



SECTION A - A

NOTES:

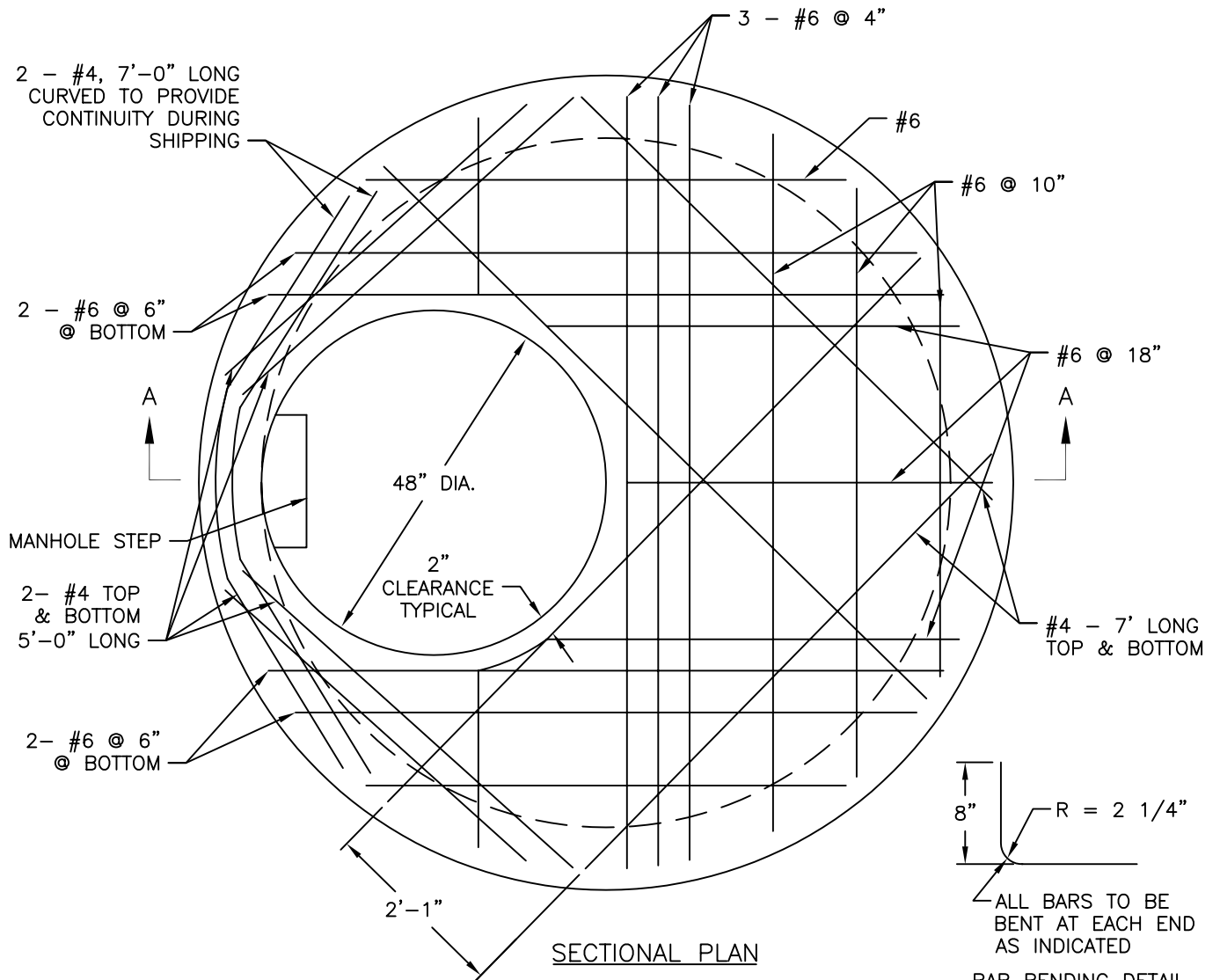
1. STRUCTURAL CALCULATIONS MUST BE SUBMITTED FOR APPROVAL PRIOR TO MANUFACTURE
2. ALL CONCRETE TO BE CLASS 4000, AIR ENTRAINED, TYPE II CEMENT
3. REINFORCING STEEL SHALL CONFORM TO ASTM A615, GRADE 60
4. WWF PER ASTM A185

APPROVED DATE: June 20, 2003

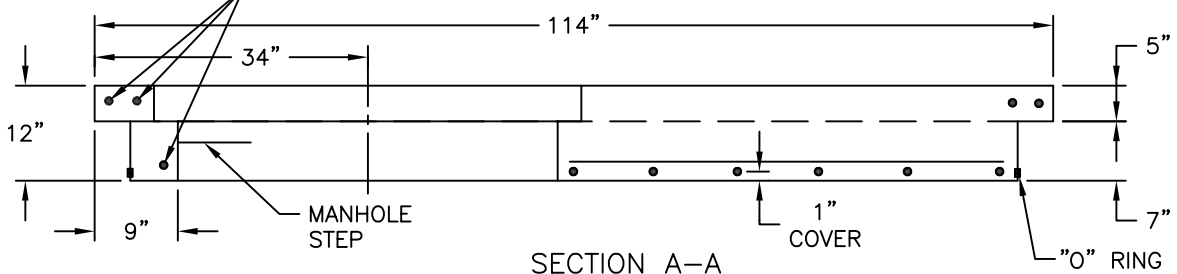
DIRECTOR, DEPARTMENT OF ENGINEERING
AND TECHNICAL SERVICES

REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL
PRECAST REDUCER SLAB
FOR 72" DIAMETER MANHOLE RISER
TO 48" DIAMETER ECCENTRIC RISER



PROVIDE AT LEAST (3) #4 CIRCUMFERENTIAL REBARS AS INDICATED



NOTES:

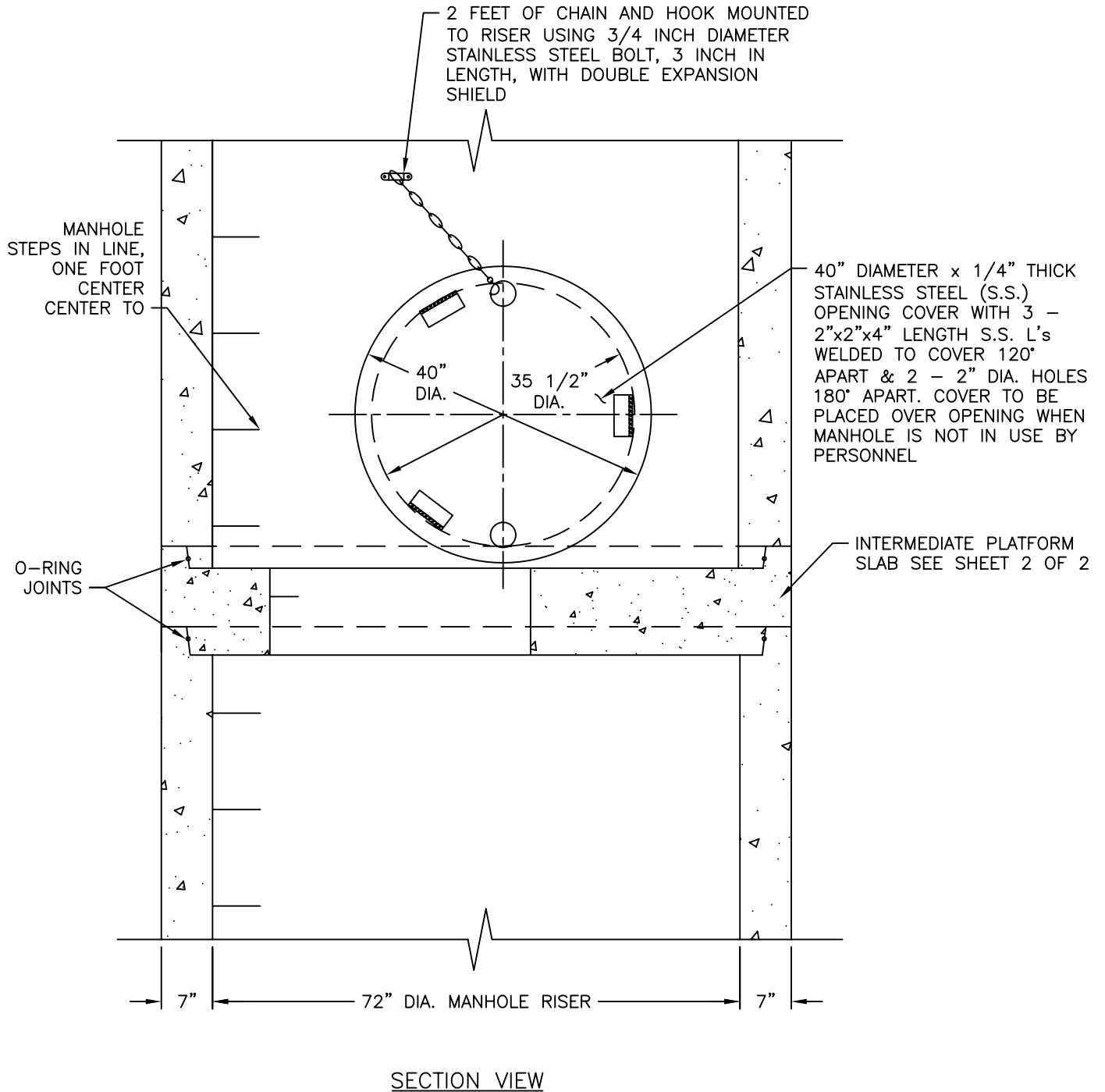
1. STRUCTURAL CALCULATIONS MUST BE SUBMITTED FOR APPROVAL PRIOR TO MANUFACTURE.

APPROVED DATE: June 20, 2003

DIRECTOR, DEPARTMENT OF ENGINEERING AND TECHNICAL SERVICES

REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL
PRECAST REDUCER SLAB
FOR 96" DIAMETER MANHOLE RISER
TO 48" DIAMETER ECCENTRIC RISER

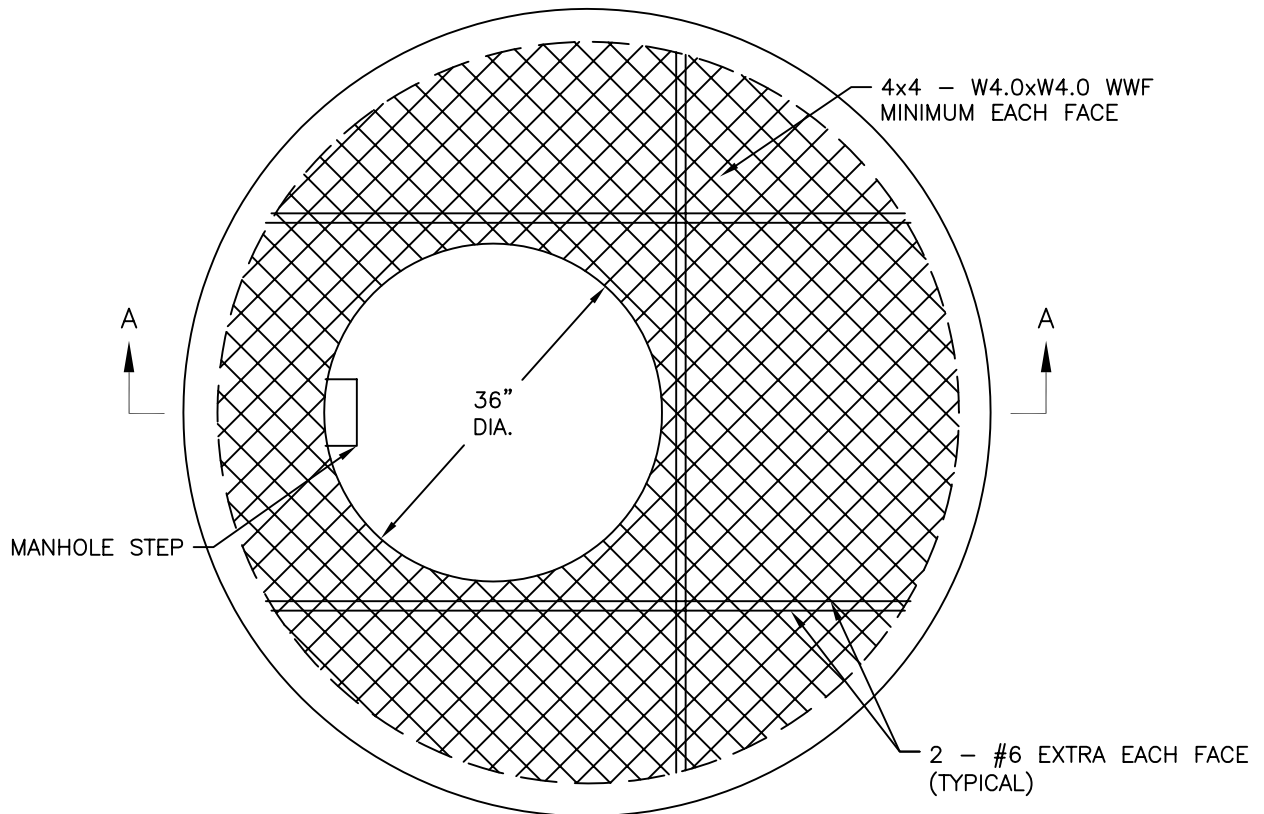


APPROVED DATE: June 20, 2003

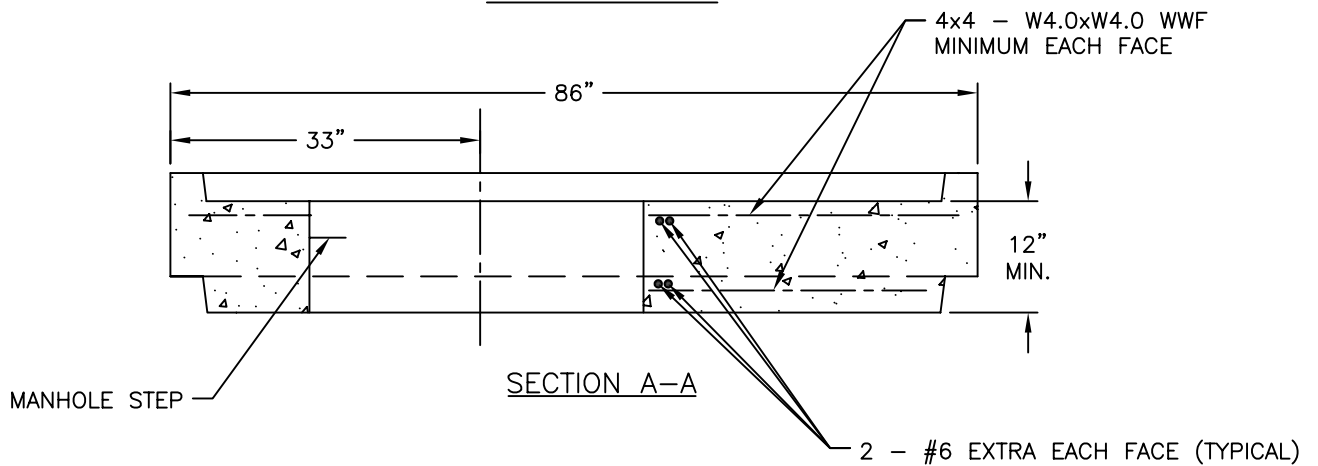
DIRECTOR, DEPARTMENT OF ENGINEERING AND TECHNICAL SERVICES

REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL
INTERMEDIATE PLATFORM SLAB
FOR 72" DIAMETER MANHOLE RISER WITH
36" DIAMETER ACCESS OPENING AND COVER



SECTIONAL PLAN



SECTION A-A

NOTES:

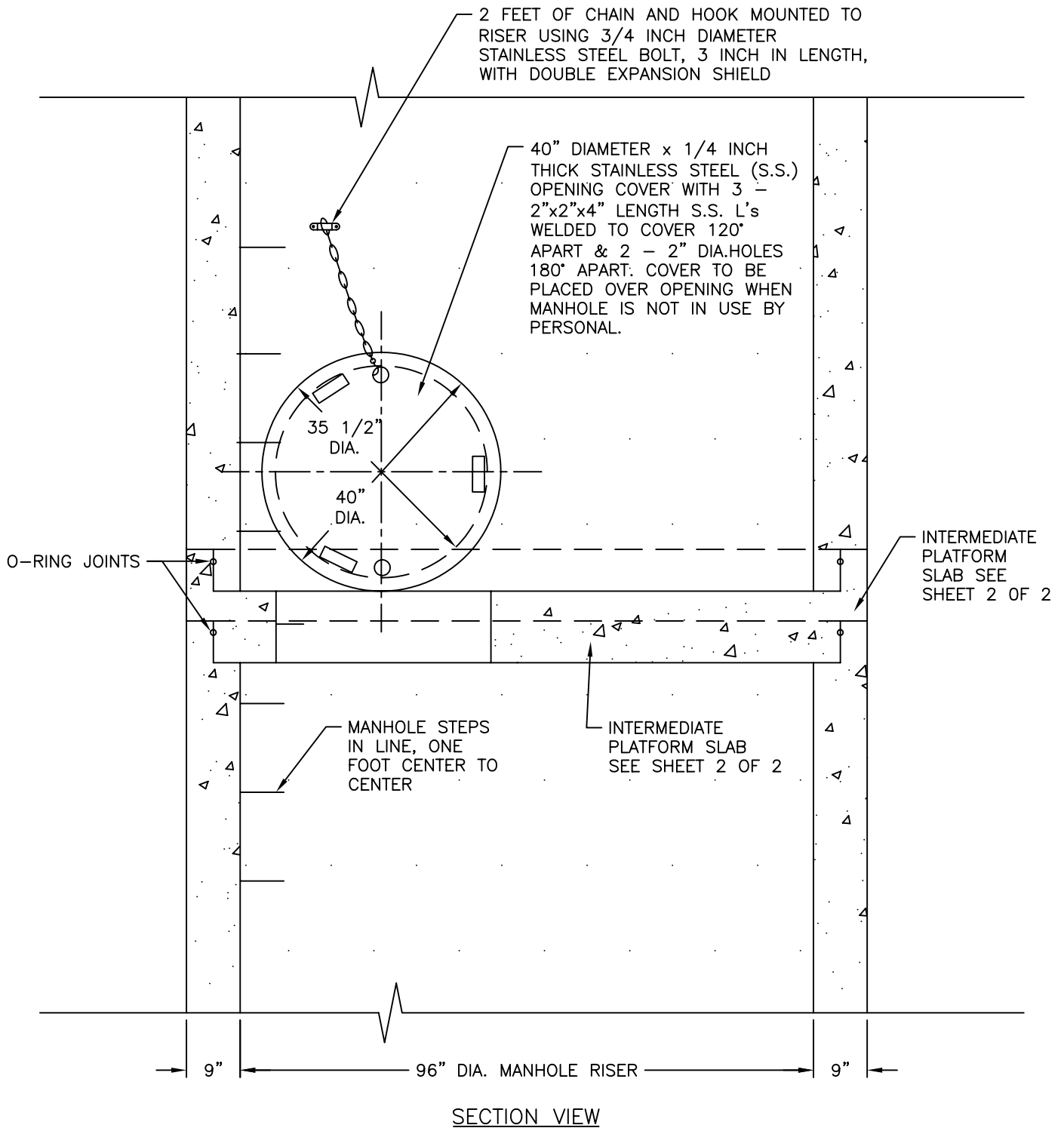
1. STRUCTURAL CALCULATIONS MUST BE SUBMITTED FOR APPROVAL PRIOR TO MANUFACTURE
2. ALL CONCRETE TO BE CLASS 4000, AIR ENTRAINED, TYPE II CEMENT.
3. ALL REINFORCING SHALL HAVE A MINIMUM OF 2-INCHES OF COVER.
4. REINFORCING STEEL SHALL CONFORM TO ASTM A615, GRADE 60
5. WWF PER ASTM A185

APPROVED DATE: June 20, 2003

DIRECTOR, DEPARTMENT OF ENGINEERING
AND TECHNICAL SERVICES

REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL
INTERMEDIATE PLATFORM SLAB
FOR 72" DIAMETER MANHOLE RISER WITH
36" DIAMETER ACCESS OPENING AND COVER

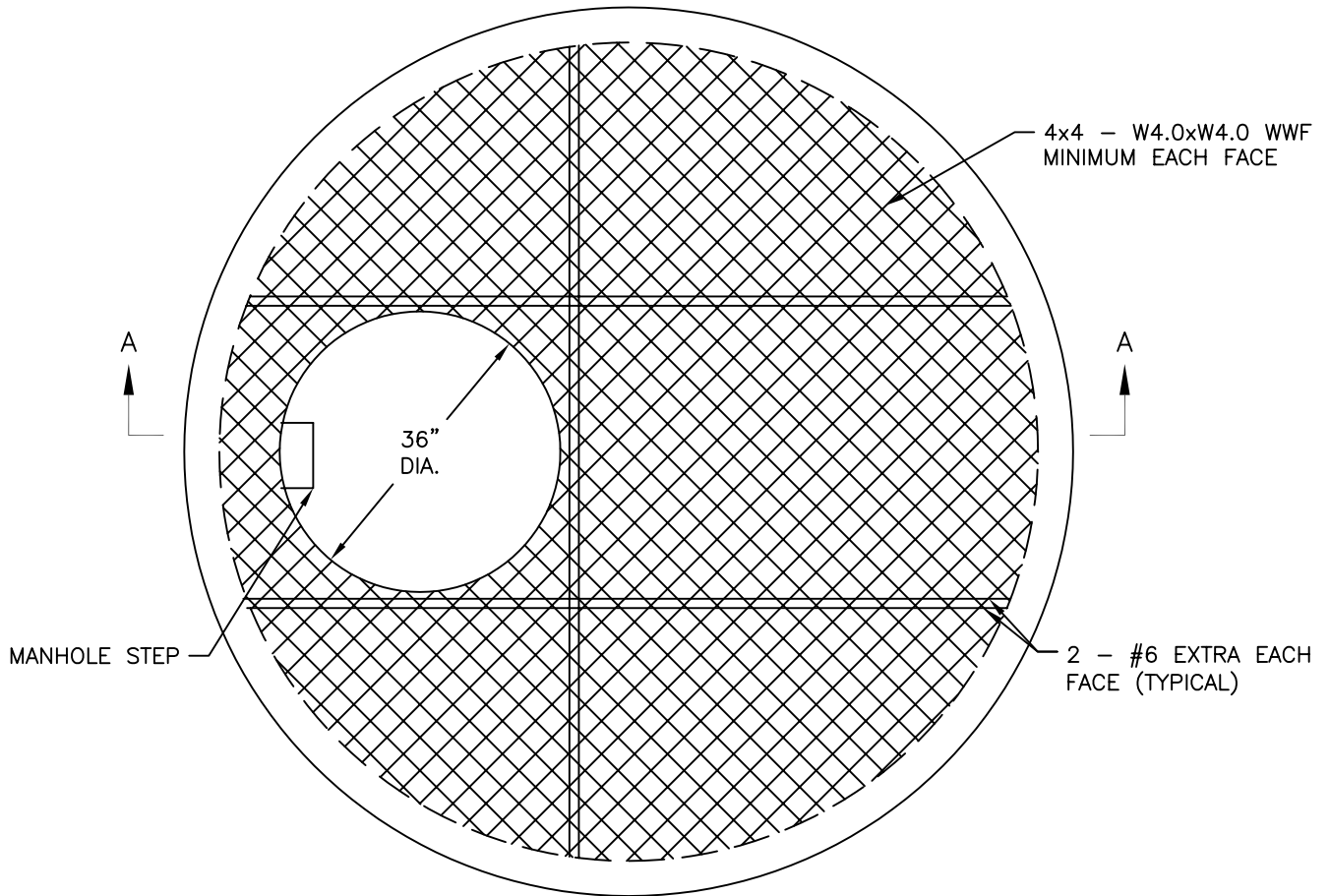


APPROVED DATE: June 20, 2003

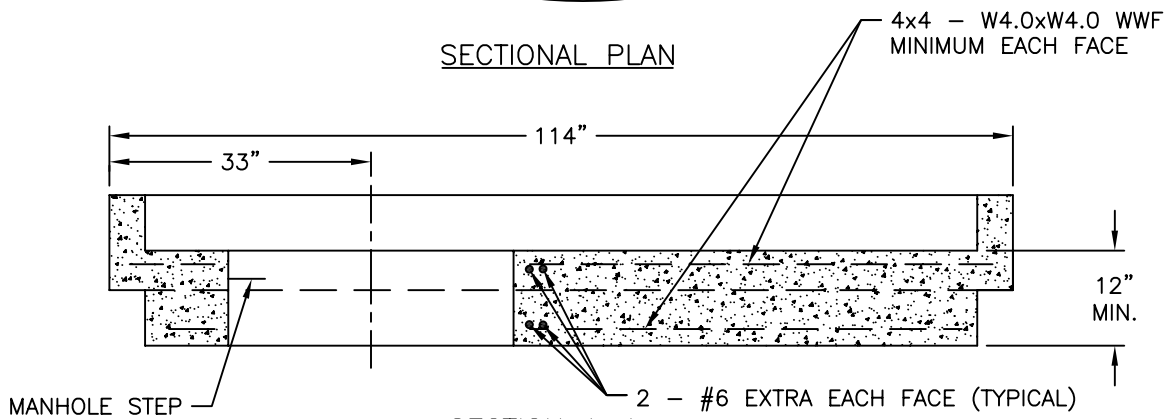
DIRECTOR, DEPARTMENT OF ENGINEERING
AND TECHNICAL SERVICES

REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL
INTERMEDIATE PLATFORM SLAB
FOR 96" DIAMETER MANHOLE RISER
WITH 36" DIA. ACCESS OPENING AND COVER



SECTIONAL PLAN



SECTION A-A

NOTES:

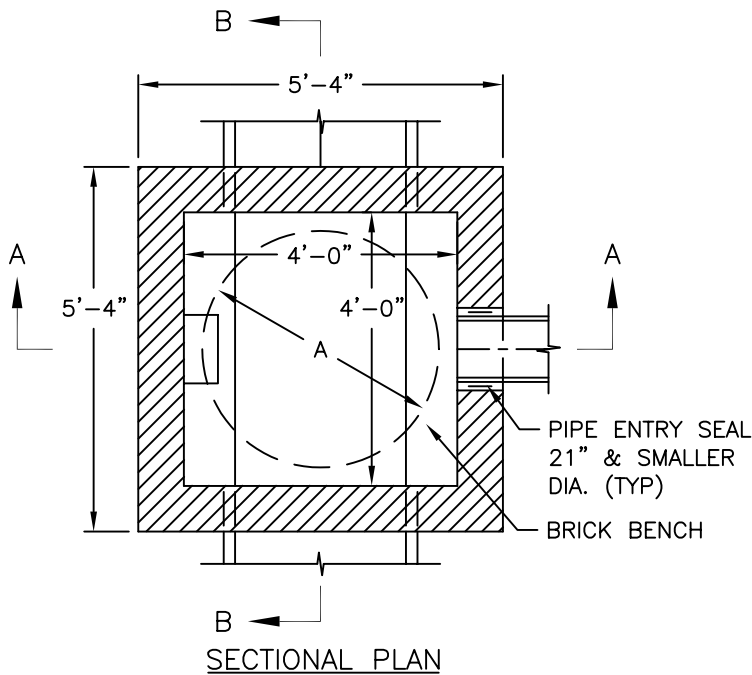
1. STRUCTURAL CALCULATIONS MUST BE SUBMITTED FOR APPROVAL PRIOR TO MANUFACTURE OF INTERMEDIATE PLATFORM SLAB.
2. ALL CONCRETE TO BE CLASS 4000, AIR ENTRAINED, TYPE II CEMENT.
3. ALL REINFORCING SHALL HAVE A MINIMUM OF 2-INCHES OF COVER.
4. REINFORCING STEEL SHALL CONFORM TO ASTM A615, GRADE 60.
5. WWF PER ASTM A185.

APPROVED DATE: June 20, 2003

DIRECTOR, DEPARTMENT OF ENGINEERING
AND TECHNICAL SERVICES

REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL
INTERMEDIATE PLATFORM SLAB
FOR 96" DIAMETER MANHOLE RISER
WITH 36" DIA. ACCESS OPENING AND COVER

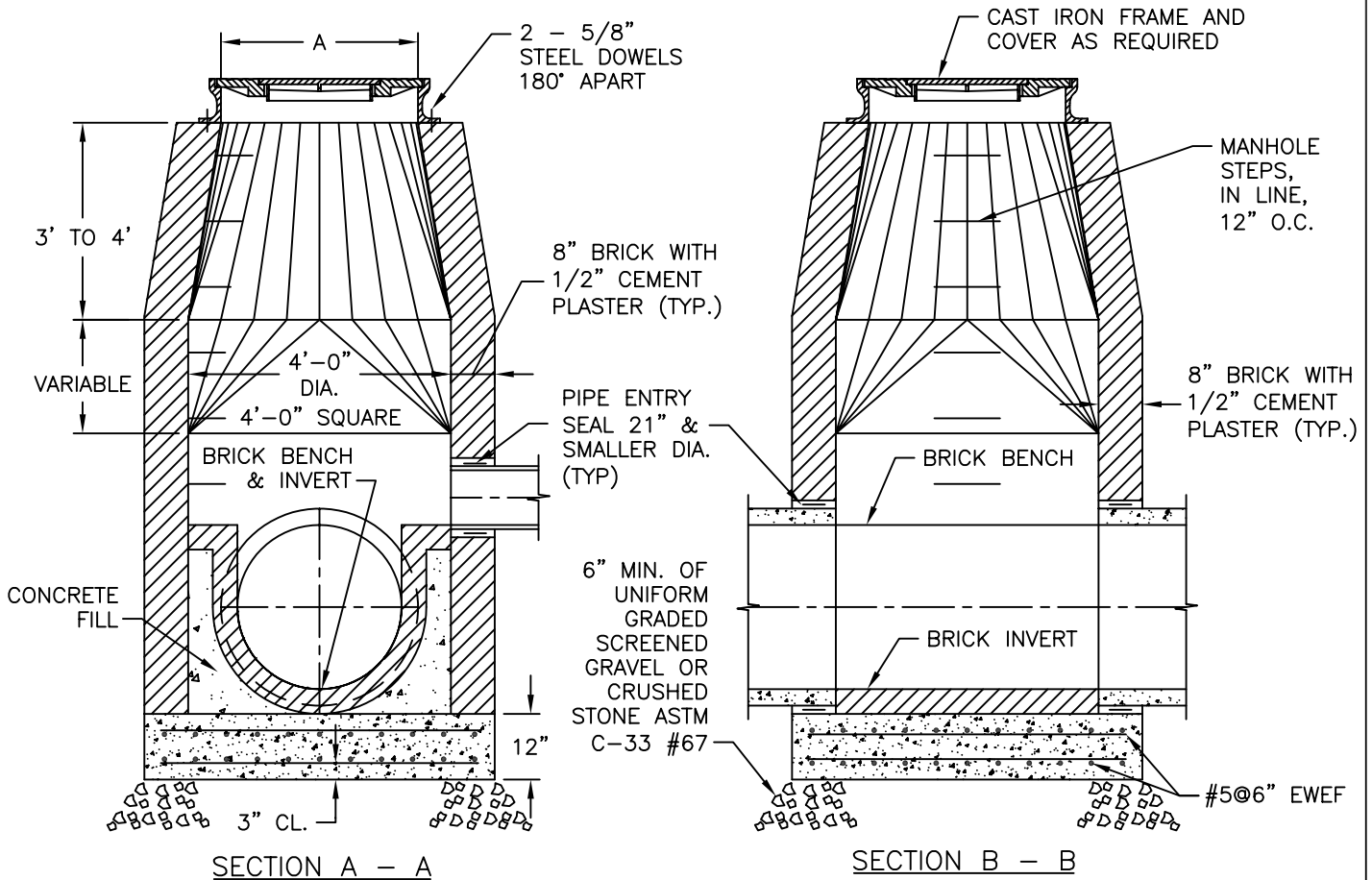


SEWER DIAMETER	FRAME DIAMETER (A)
10" THRU 21"	24"
24" THRU 36"	36" *

* IF SURFACE TO INVERT < 15', A 36"x24" DIA. ADAPTER RING WITH 24" DIA. COVER SHALL BE USED.

NOTES:

1. ALL CONCRETE TO BE CLASS 4000, AIR ENTRAINED, TYPE II CEMENT
2. REINFORCING STEEL SHALL CONFORM TO ASTM A-615, GRADE 60
3. WHEN THE MANHOLE DEPTH EXCEEDS 15 FEET, THE BRICK WALL THICKNESS SHALL BE INCREASED TO 12 INCHES BELOW THE 15 FOOT DEPTH

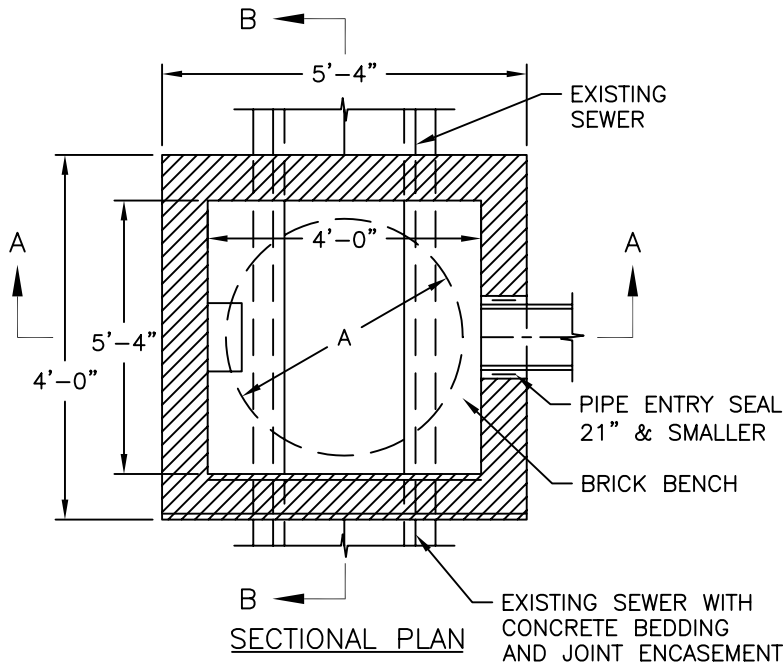


APPROVED DATE: June 20, 2003

DIRECTOR, DEPARTMENT OF ENGINEERING
AND TECHNICAL SERVICES

REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL
BRICK MANHOLE
FOR NEW 10" THRU 36" DIAMETER SEWERS
WITH CAST IN PLACE CONCRETE BASE

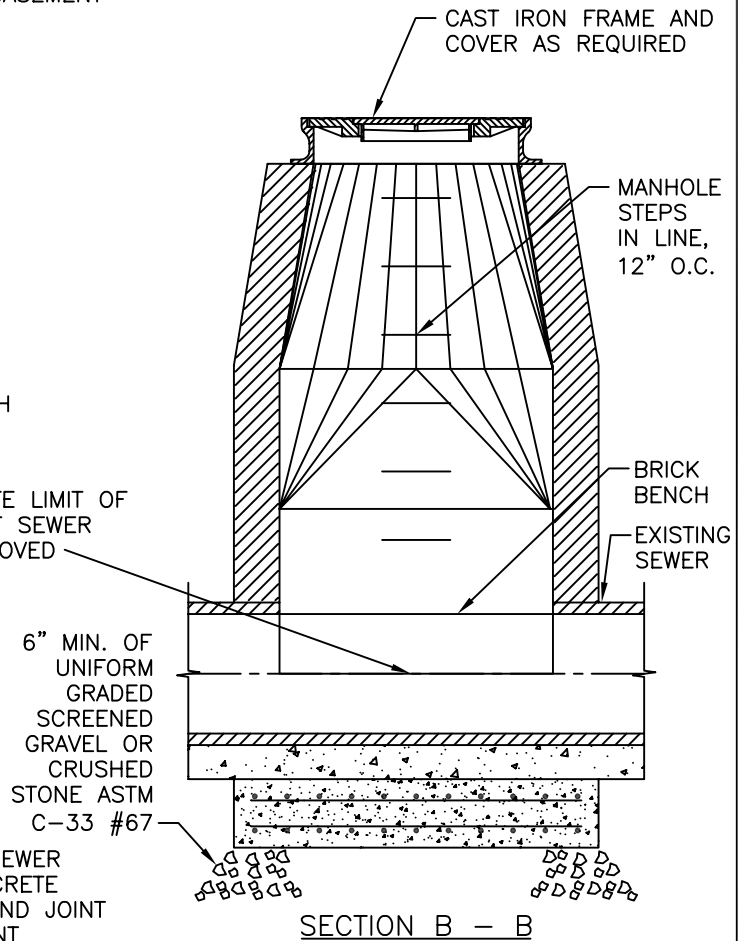
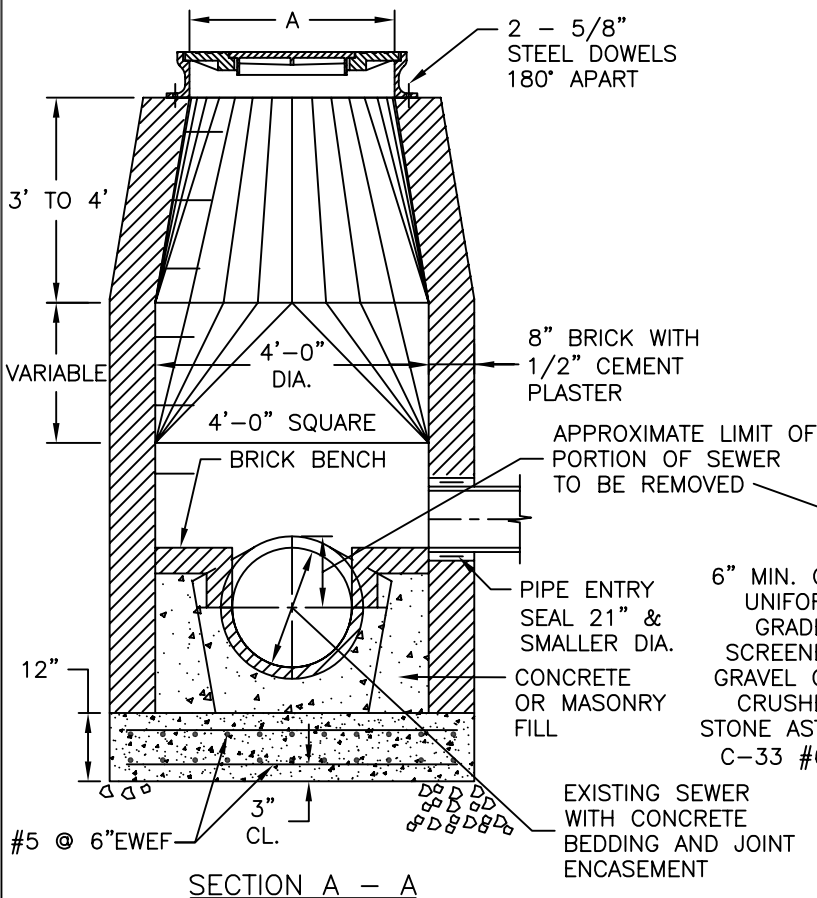


SEWER DIAMETER	FRAME DIAMETER (A)
10" THRU 21"	24"
24" THRU 36"	36" *

* IF SURFACE TO INVERT < 15', A 36"X24" DIA. ADAPTER RING WITH 24" DIA. COVER SHALL BE USED.

NOTES:

1. ALL CONCRETE TO BE CLASS 4000 AIR ENTRAINED, TYPE II CEMENT.
2. REINFORCING STEEL SHALL CONFORM TO ASTM A-615, GRADE 60.
3. WHEN THE MANHOLE DEPTH EXCEEDS 15 FEET, THE BRICK WALL THICKNESS SHALL BE INCREASED TO 12 INCHES BELOW THE 15 FOOT DEPTH.

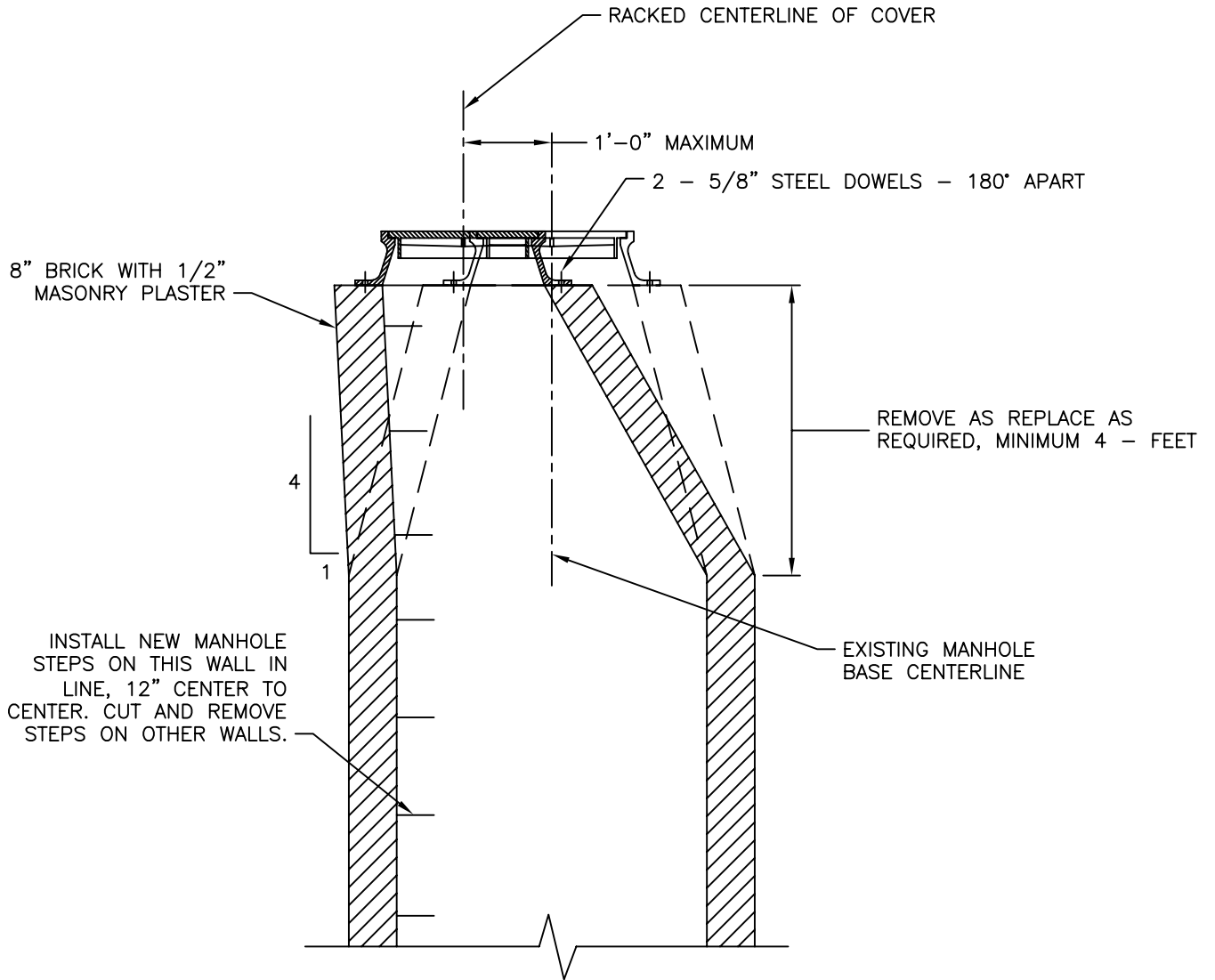


APPROVED DATE: June 20, 2003

DIRECTOR, DEPARTMENT OF ENGINEERING
AND TECHNICAL SERVICES

REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL
BRICK MANHOLE
OVER EXISTING 10" THRU 36" DIAMETER
SEWERS WITH CAST IN PLACE CONCRETE BASE



SECTIONAL VIEW

SEWER DIAMETER	FRAME AND COVER DIAMETER (A)
10" THRU 21"	24"
24" THRU 36"	36" *

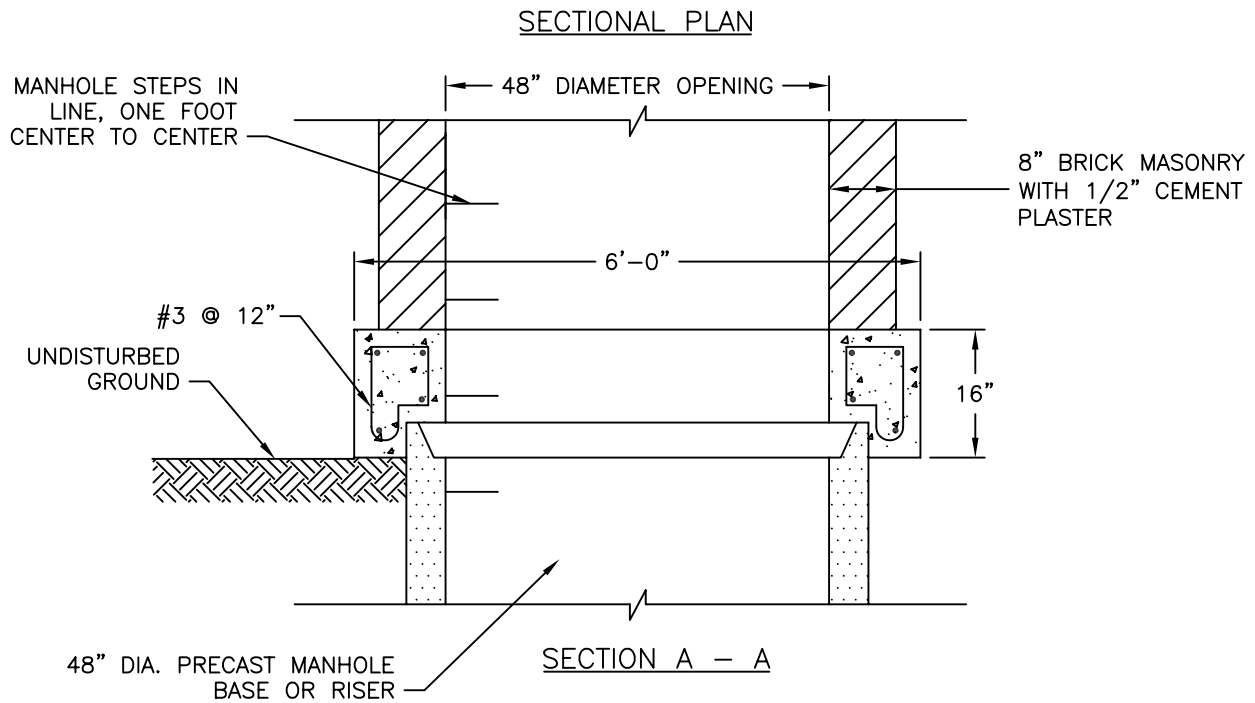
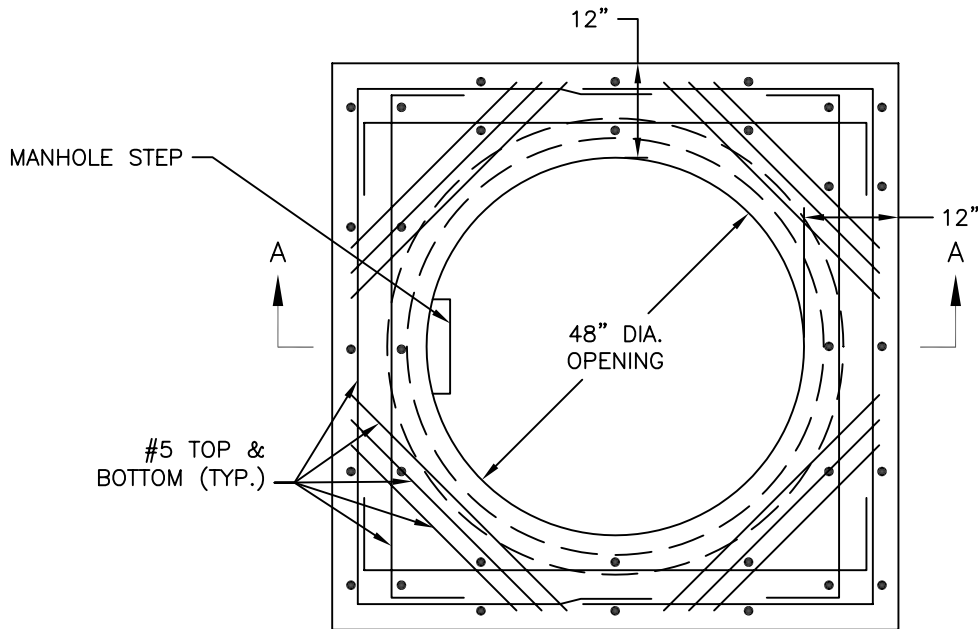
* 15 - FEET OR LESS, SURFACE TO INVERT, A 36" X 24" DIAMETER ADAPTER RING WITH 24" DIAMETER COVER SHALL BE USED.

APPROVED DATE: June 20, 2003

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STANDARD DETAIL
BRICK MANHOLE RACKING



NOTES:

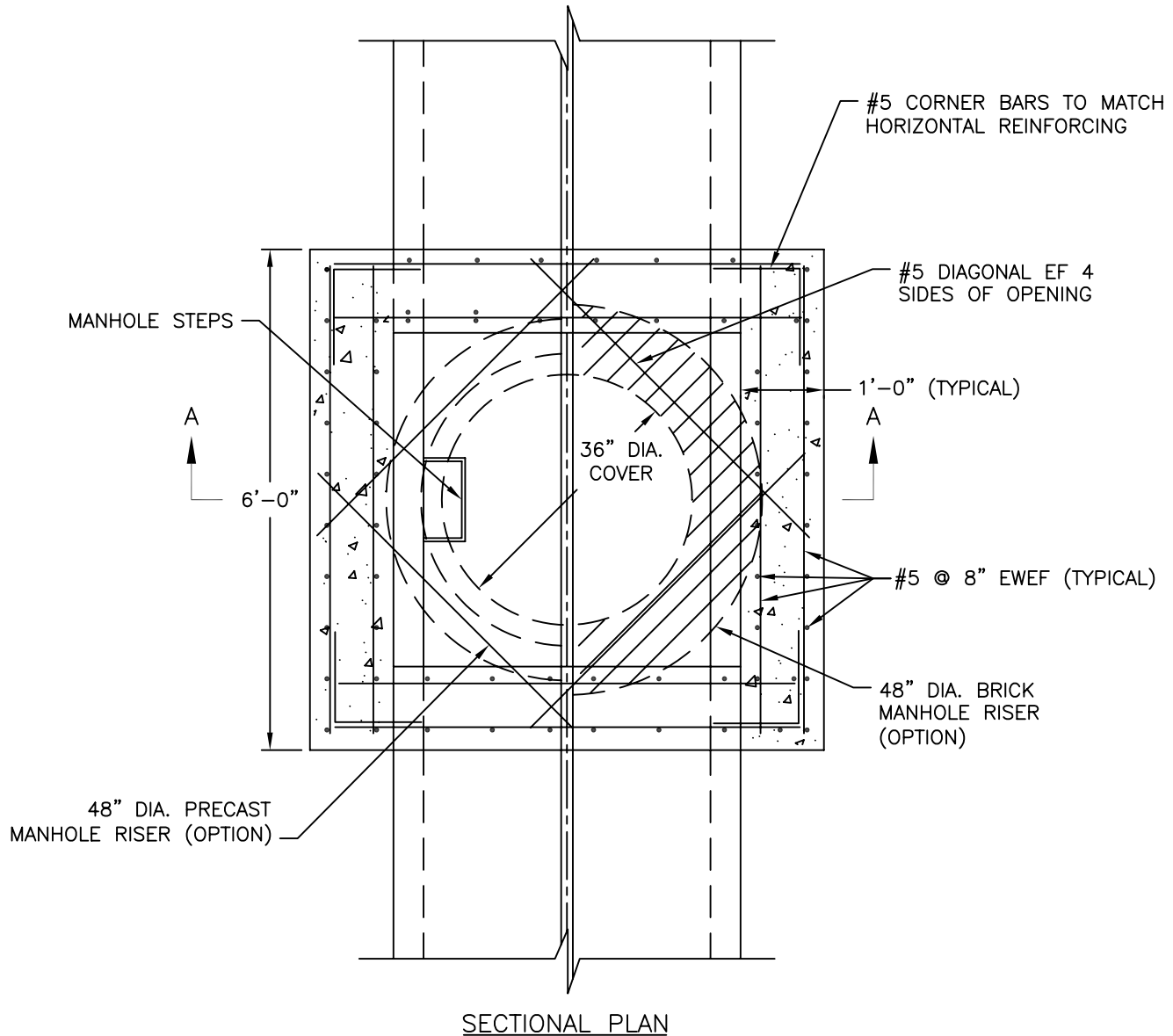
1. ALL CONCRETE TO BE CLASS 4000, AIR ENTRAINED, TYPE II CEMENT.
2. REINFORCING STEEL SHALL CONFIRM TO ASTM A-615 GRADE 60.

APPROVED DATE: June 20, 2003

DIRECTOR, DEPARTMENT OF ENGINEERING
AND TECHNICAL SERVICES

REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL
CONCRETE TRANSITION SLAB
FOR BRICK MANHOLE RISER
OVER 48" PRECAST MANHOLE BASE



NOTES:

1. ALL CONCRETE TO BE CLASS 4,000 AIR ENTRAINED, TYPE II CEMENT.
2. REINFORCING STEEL SHALL CONFORM TO ASTM A615 GRADE 60.
3. FOR MANHOLES DEPTHS GREATER THAN 15' TO INVERT, USE 36" DIAMETER CAST IRON FRAME AND COVER. FOR MANHOLE DEPTHS EQUAL TO 15' OR LESS, USE A 36"X 24" ADAPTER RING WITH A 24" DIAMETER COVER.
4. MAXIMUM TOTAL DEPTH 20 FT.

SEWER DIAMETER	DIMENSION "A"	DIMENSION "B"
33" THRU 36"	4'-0"	7'-2"
42"	4'-3"	7'-10 1/4"
48"	4'-10"	8'-4"

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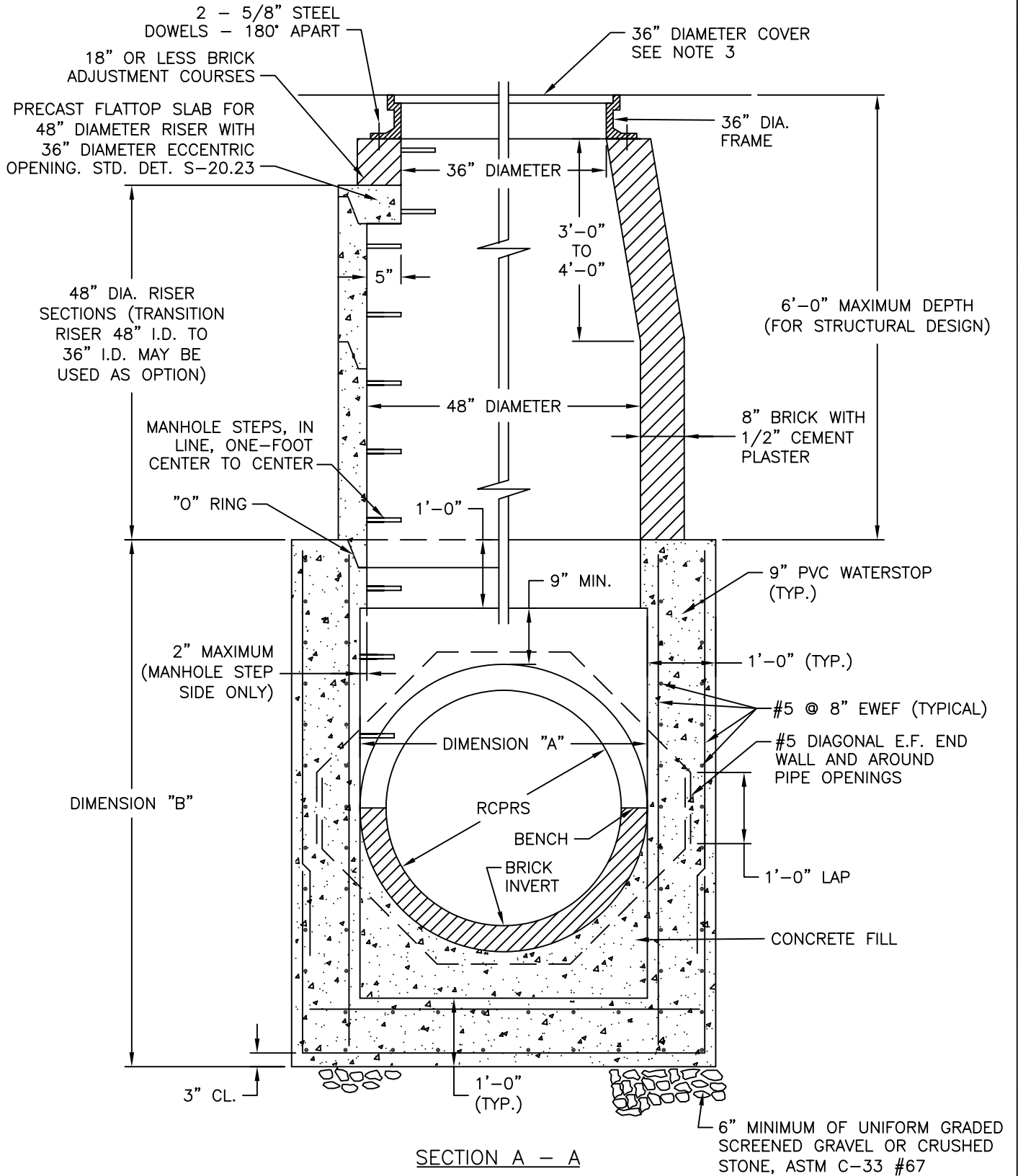
REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL
CAST IN PLACE CONCRETE MANHOLE BASE
FOR NEW 33" THRU 48" DIAMETER SEWERS
WITH PIPE OR BRICK RISER OPTIONS

DISTRICT OF COLUMBIA
WATER AND SEWER AUTHORITY

S-22.03

2 OF 2



APPROVED DATE: June 20, 2003

DIRECTOR, DEPARTMENT OF ENGINEERING AND TECHNICAL SERVICES

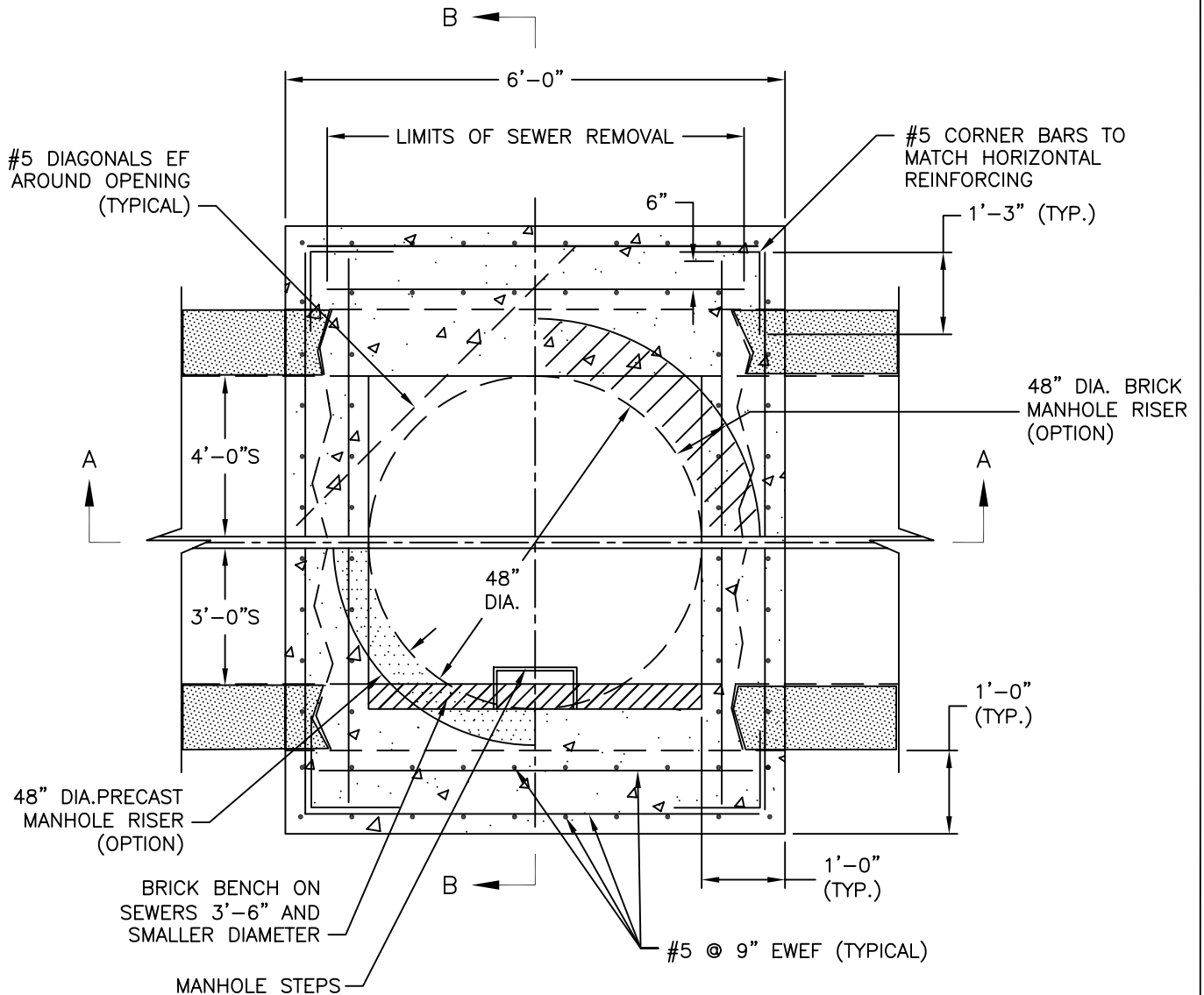
REVISION NO.: 0

DATE: 6/20/03

PREPARED BY: OBG/BKJV

CHECKED BY: W.DARROW

STANDARD DETAIL
CAST IN PLACE CONCRETE MANHOLE BASE
FOR NEW 33" THRU 48" DIAMETER SEWERS
WITH PIPE OR BRICK RISER OPTIONS



SECTIONAL PLAN

NOTES:

1. ALL CONCRETE TO BE CLASS 4000, AIR ENTRAINED, TYPE II CEMENT.
2. REINFORCING STEEL SHALL CONFORM TO ASTM A615, GRADE 60.
3. FOR MANHOLE DEPTHS GREATER THAN 15' TO INVERT, USE 36" DIAMETER CAST IRON FRAME AND COVER. FOR MANHOLE DEPTHS EQUAL TO 15' OR LESS, USE A 36"X 24" ADAPTER RING WITH A 24" DIAMETER COVER.
4. MAXIMUM DEPTH 20 FT.

APPROVED DATE: June 20, 2003

REVISION NO.: 0

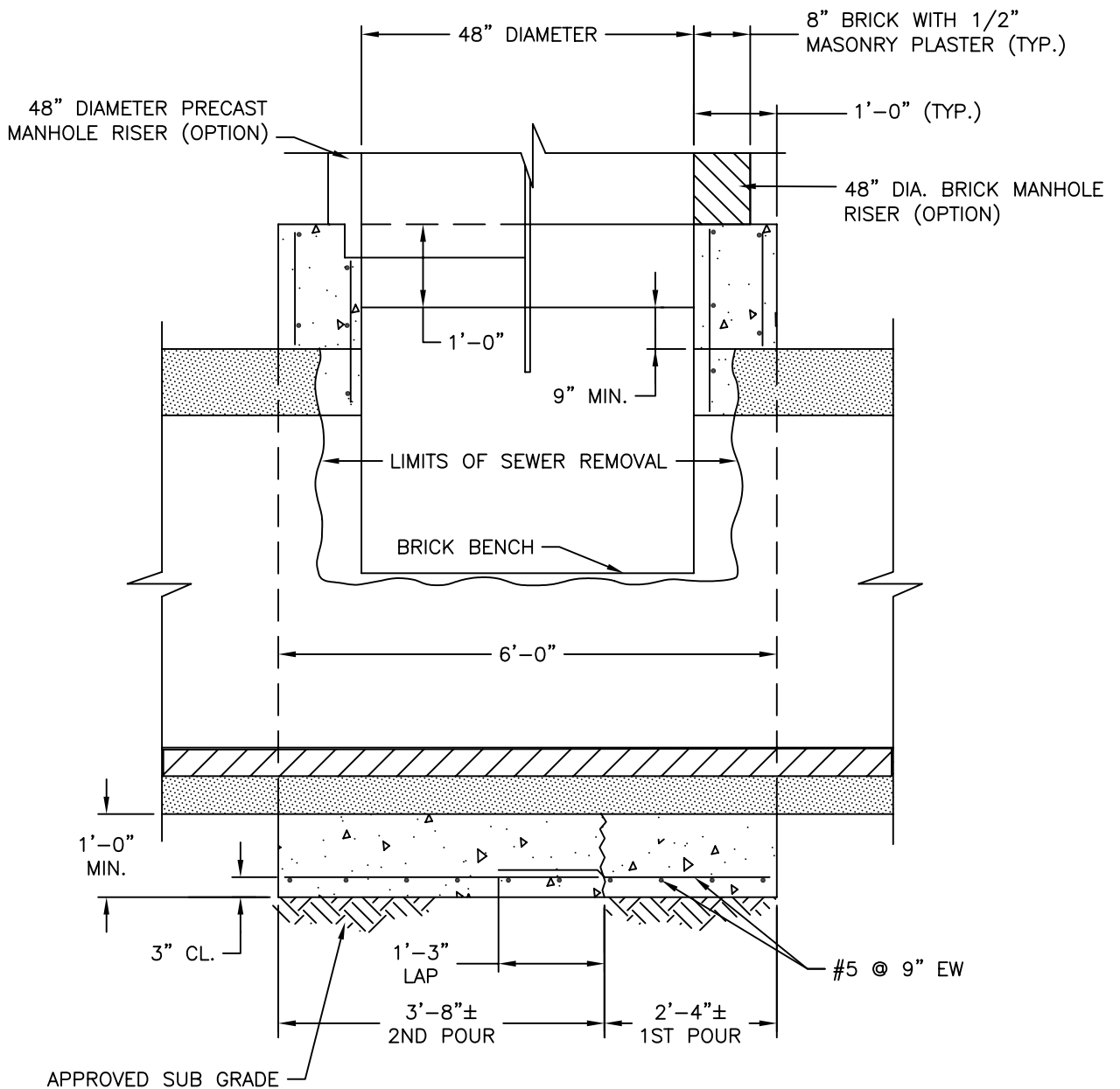
DATE: 6/20/03

DIRECTOR, DEPARTMENT OF ENGINEERING
AND TECHNICAL SERVICES

PREPARED BY: OBG/BKJV

CHECKED BY: W.DARROW

STANDARD DETAIL
CAST IN PLACE CONCRETE MANHOLE BASE
ON EXISTING 3-FOOT TO 4-FOOT DIAMETER
CONCRETE MASONRY SEWERS



SECTION A-A

NOTE:

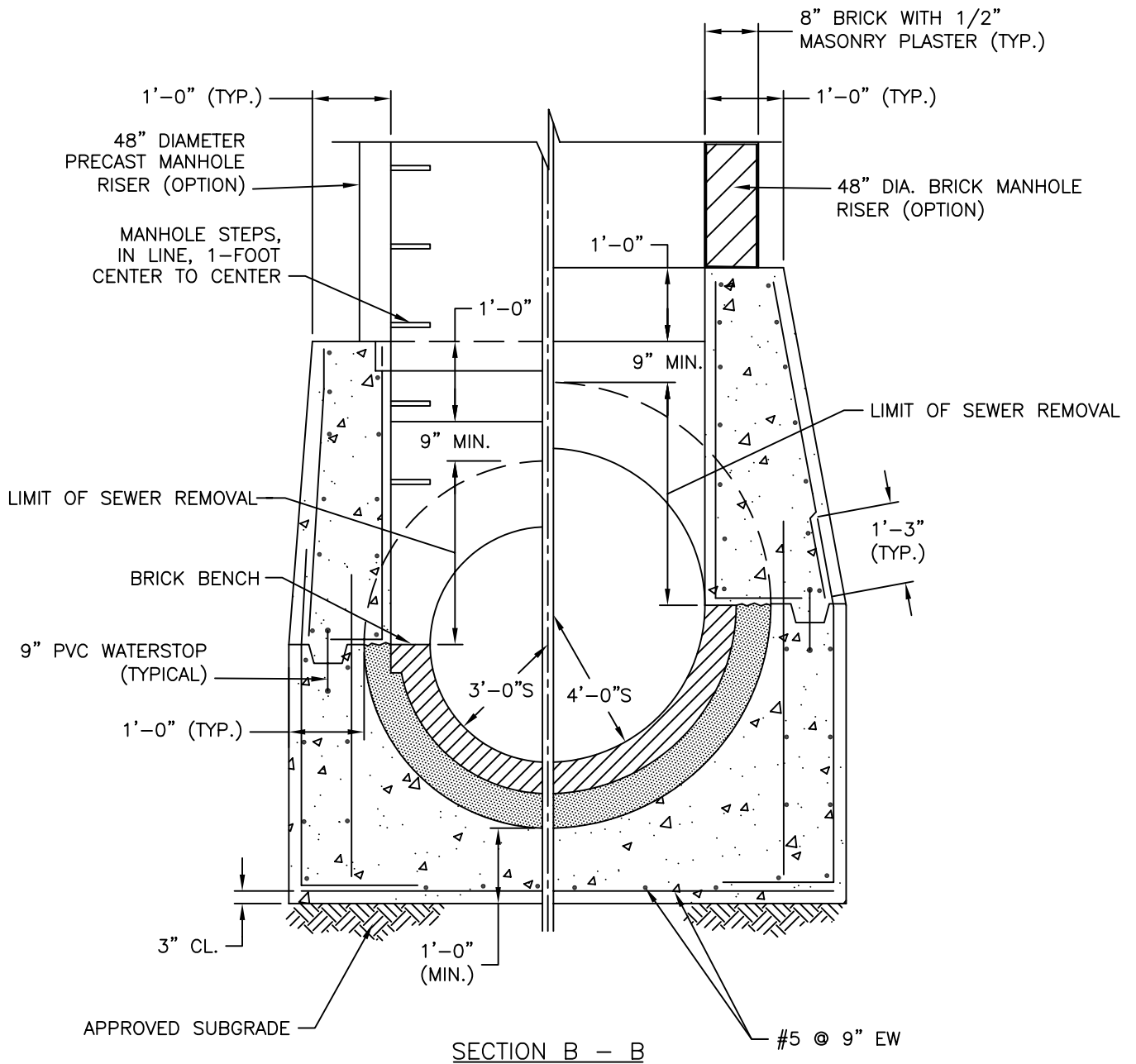
FIRST POUR SHALL BE ALLOWED TO CURE A MINIMUM 24 HOURS PRIOR TO EXCAVATING AND PLACING SECOND POUR.

APPROVED DATE: June 20, 2003

DIRECTOR, DEPARTMENT OF ENGINEERING
 AND TECHNICAL SERVICES

REVISION NO.: 0
 DATE: 6/20/03
 PREPARED BY: OBG/BKJV
 CHECKED BY: W.DARROW

STANDARD DETAIL
 CAST IN PLACE CONCRETE MANHOLE BASE
 ON EXISTING 3-FOOT TO 4-FOOT DIAMETER
 CONCRETE MASONRY SEWERS

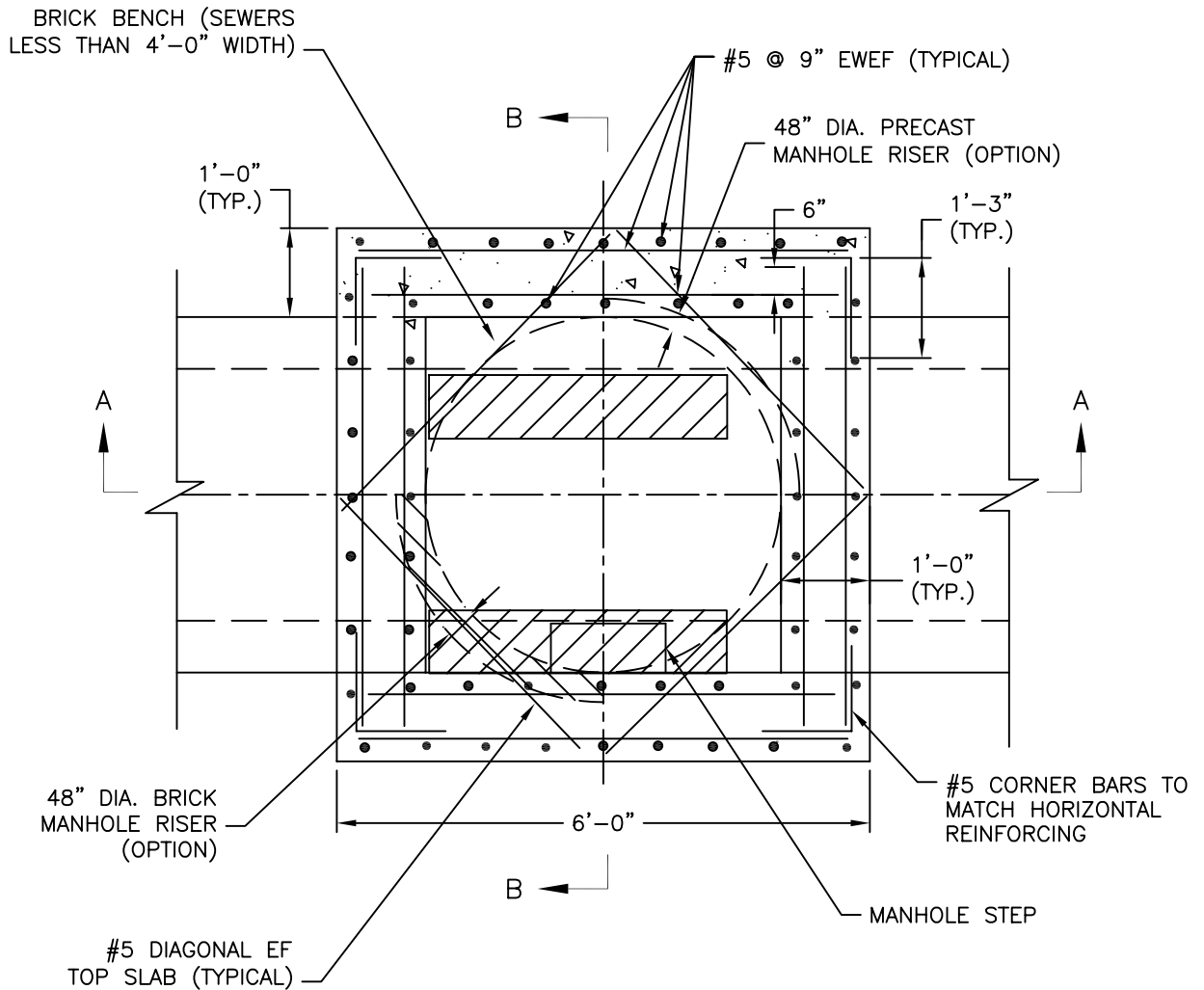


APPROVED DATE: June 20, 2003

DIRECTOR, DEPARTMENT OF ENGINEERING
 AND TECHNICAL SERVICES

REVISION NO.: 0
 DATE: 6/20/03
 PREPARED BY: OBG/BKJV
 CHECKED BY: W.DARROW

STANDARD DETAIL
 CAST IN PLACE CONCRETE MANHOLE BASE
 ON EXISTING 3-FOOT TO 4-FOOT DIAMETER
 CONCRETE MASONRY SEWERS



SECTIONAL PLAN

NOTES:

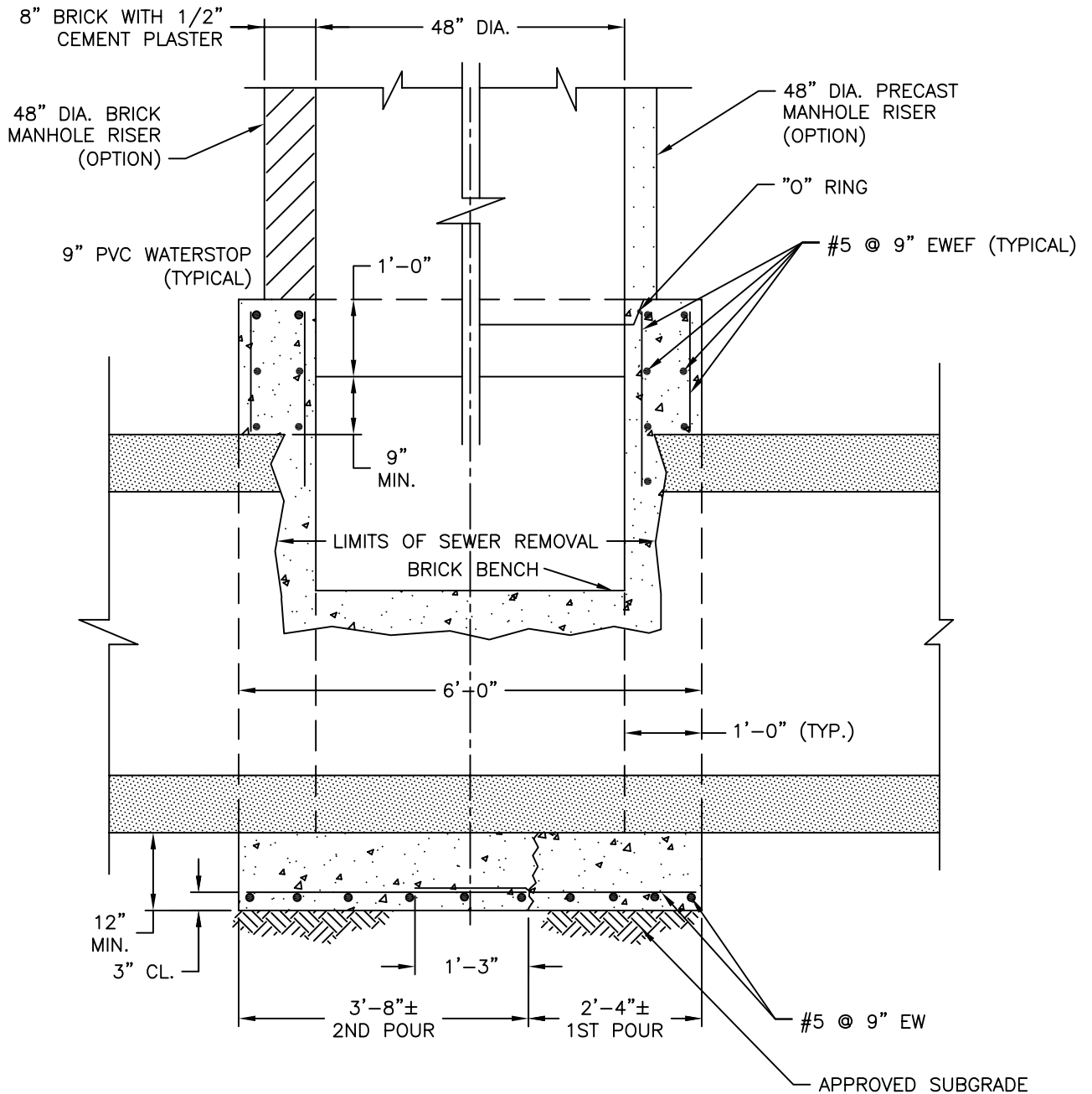
1. ALL CONCRETE TO BE CLASS 4000 AIR ENTRAINED, TYPE II CEMENT.
2. REINFORCING STEEL SHALL CONFORM TO ASTM A-615 GRADE 60
3. FOR MANHOLE DEPTHS GREATER THAN 15' TO INVERT, USE 36" DIAMETER CAST IRON FRAME AND COVER. FOR MANHOLE DEPTHS EQUAL TO 15' OR LESS, USE A 36" X 24" ADAPTER RING WITH A 24" DIAMETER COVER.
4. MAXIMUM DEPTH 20 FT.

APPROVED DATE: June 20, 2003

DIRECTOR, DEPARTMENT OF ENGINEERING AND TECHNICAL SERVICES

REVISION NO.: 0
 DATE: 6/20/03
 PREPARED BY: OBG/BKJV
 CHECKED BY: W.DARROW

STANDARD DETAIL
 CAST IN PLACE CONCRETE MANHOLE BASE
 ON EXISTING 2'-0" X 3'-0" THRU 4'-0" X 6'-0"
 EGG - SHAPED SEWERS



SECTION A-A

NOTE:

FIRST POUR SHALL BE ALLOWED TO CURE A MINIMUM 24 HOURS PRIOR TO EXCAVATING AND PLACING SECOND POUR.

APPROVED DATE: June 20, 2003

REVISION NO.: 0

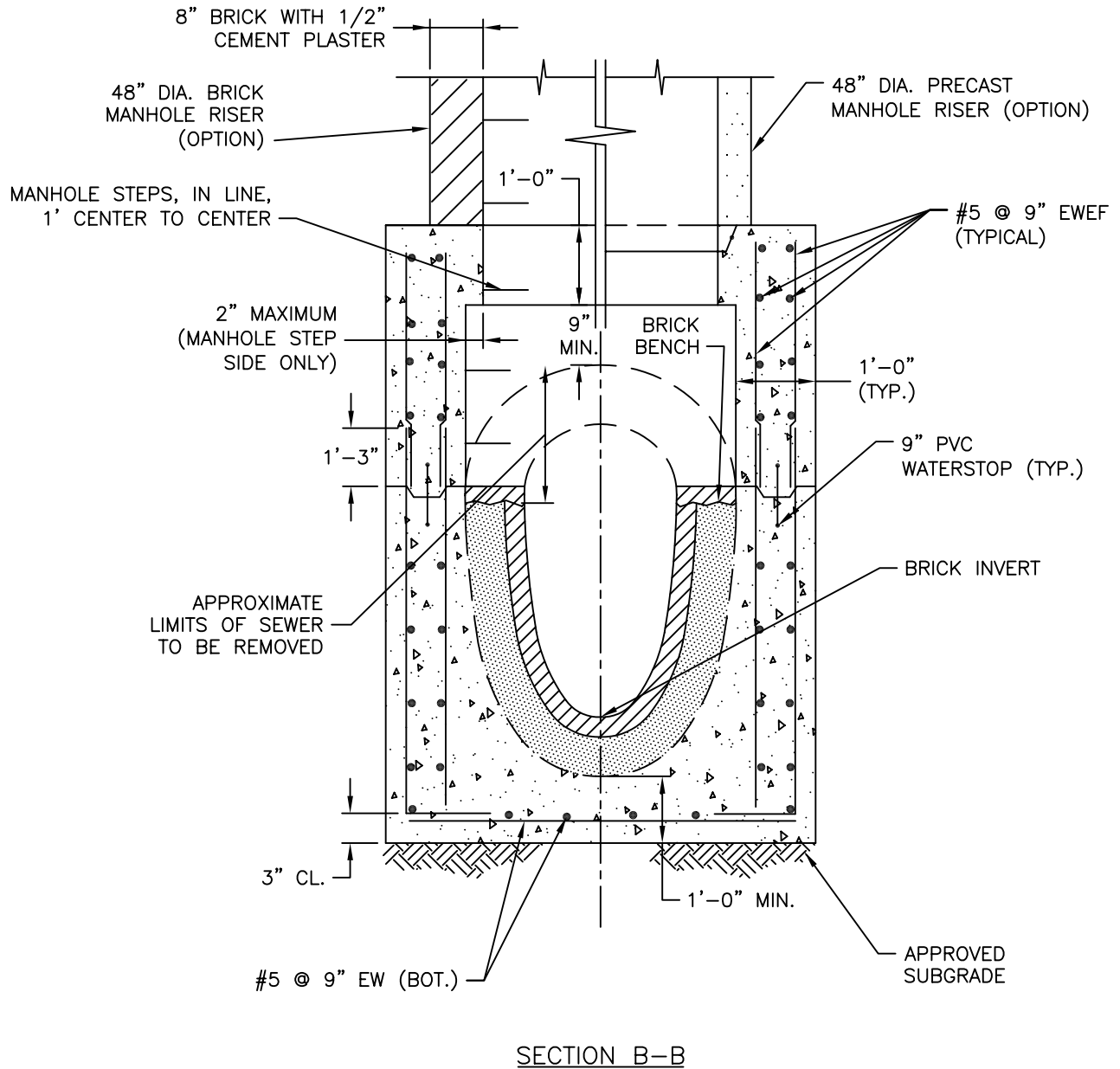
DATE: 6/20/03

PREPARED BY: OBG/BKJV

CHECKED BY: W.DARROW

DIRECTOR, DEPARTMENT OF ENGINEERING AND TECHNICAL SERVICES

STANDARD DETAIL
CAST IN PLACE CONCRETE MANHOLE BASE
ON EXISTING 2'-0" X 3'-0" THRU 4'-0" X 6'-0"
EGG - SHAPED SEWERS

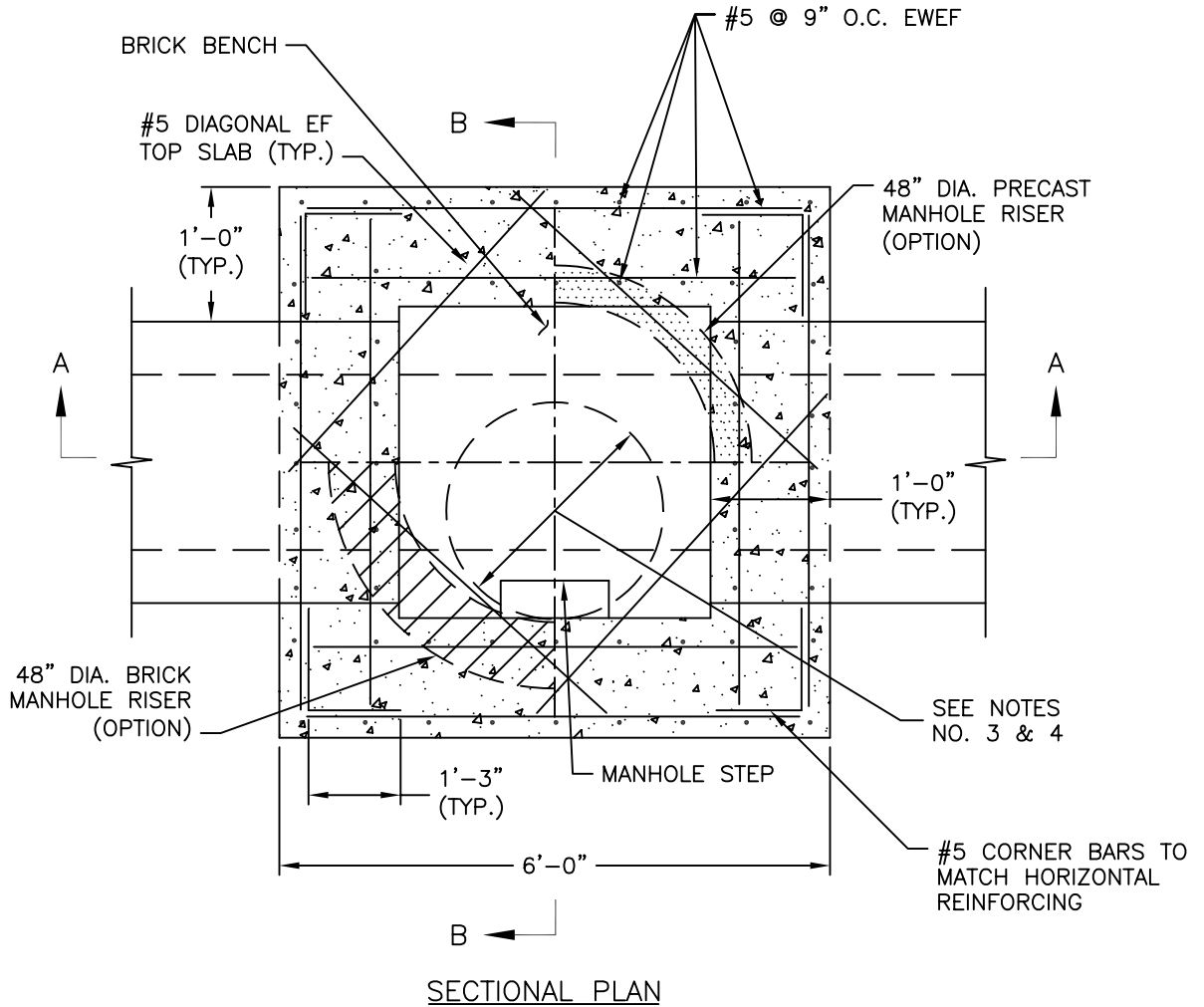


APPROVED DATE: June 20, 2003

DIRECTOR, DEPARTMENT OF ENGINEERING
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REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
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STANDARD DETAIL
CAST IN PLACE CONCRETE MANHOLE BASE
ON EXISTING 2'-0" X 3'-0" THRU 4'-0" X 6'-0"
EGG - SHAPED SEWERS



NOTES:

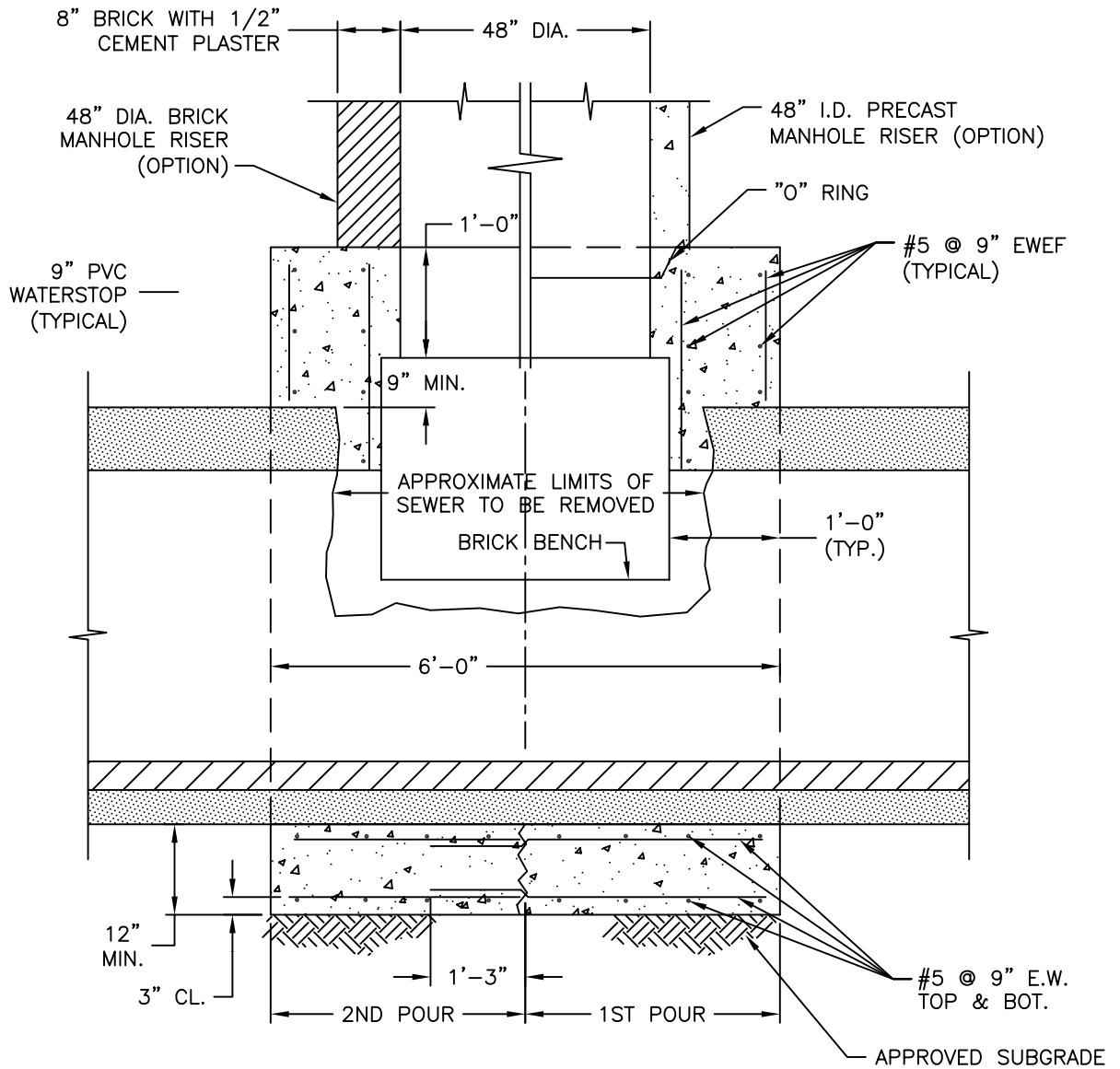
1. ALL CONCRETE TO BE CLASS 4000, AIR ENTRAINED, TYPE II CEMENT
2. REINFORCING STEEL SHALL CONFORM TO ASTM A-615 GRADE 60
3. FOR DEPTHS 15 FT. OR LESS TO INVERT USE 36"x24" ADAPTER RING WITH 24" DIAMETER COVER
4. FOR DEPTHS 15'-6" OR GREATER, USE 36" DIAMETER COVER
5. MAXIMUM DEPTH 20 FT.

APPROVED DATE: June 20, 2003

DIRECTOR, DEPARTMENT OF ENGINEERING
 AND TECHNICAL SERVICES

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 PREPARED BY: OBG/BKJV
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STANDARD DETAIL
 CAST IN PLACE CONCRETE MANHOLE BASE
 ON EXISTING
 2'-0" X 3'-0" SEWERS



SECTION A-A

NOTE:

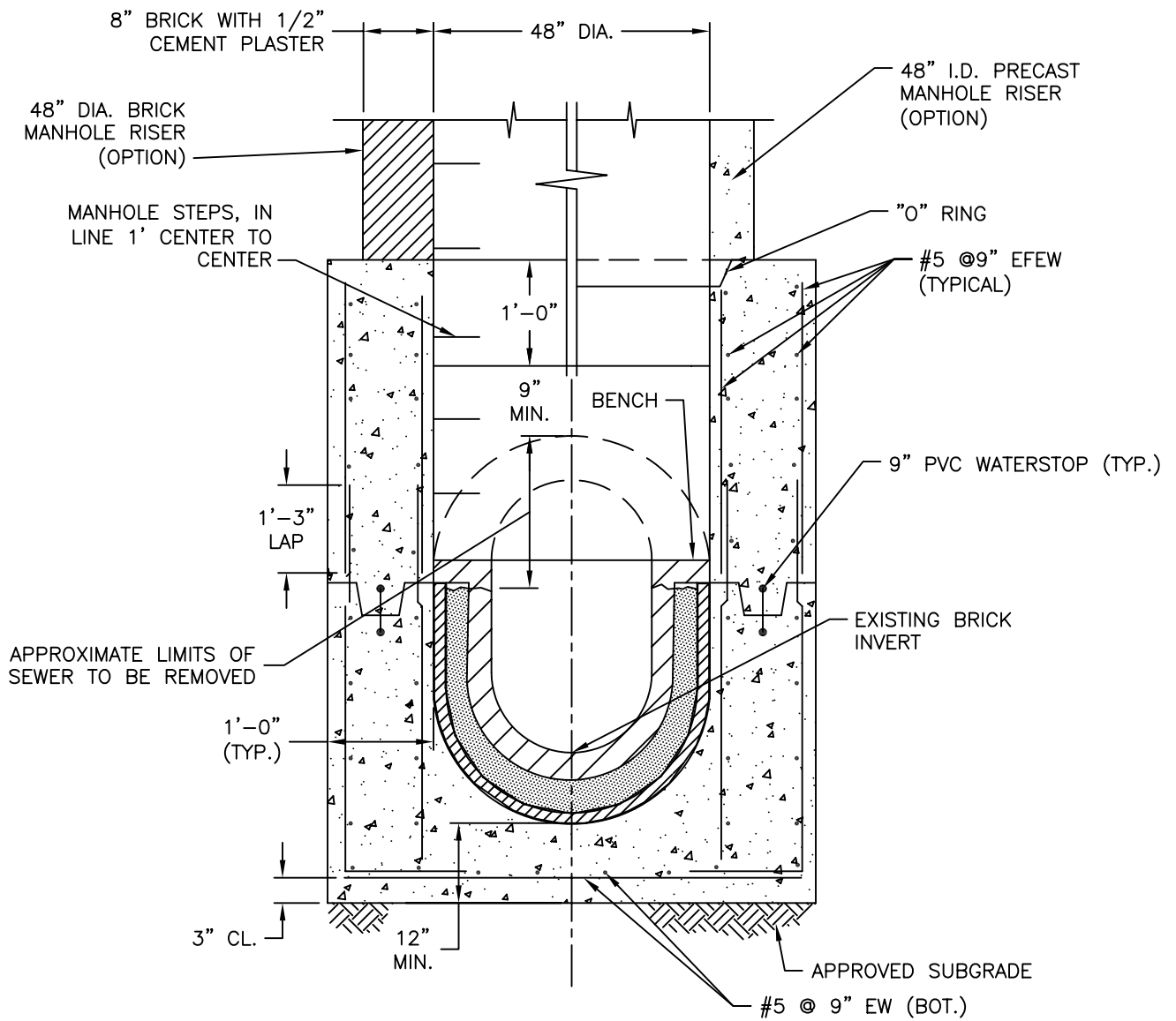
FIRST POUR SHALL BE ALLOWED TO CURE A MINIMUM 24 HOURS PRIOR TO EXCAVATING AND PLACING SECOND POUR.

APPROVED DATE: June 20, 2003

DIRECTOR, DEPARTMENT OF ENGINEERING AND TECHNICAL SERVICES

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STANDARD DETAIL
CAST IN PLACE CONCRETE MANHOLE BASE
ON EXISTING
2'-0" X 3'-0" SEWERS



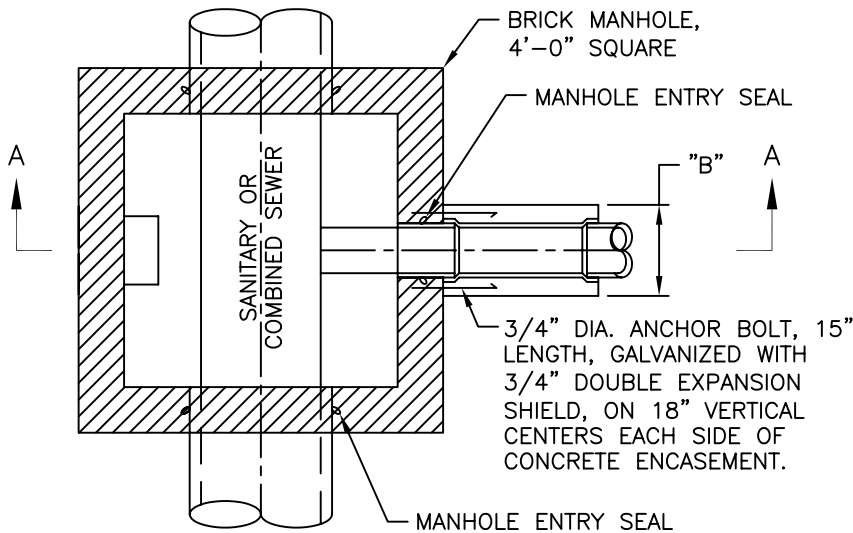
SECTION B-B

APPROVED DATE: June 20, 2003

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 AND TECHNICAL SERVICES

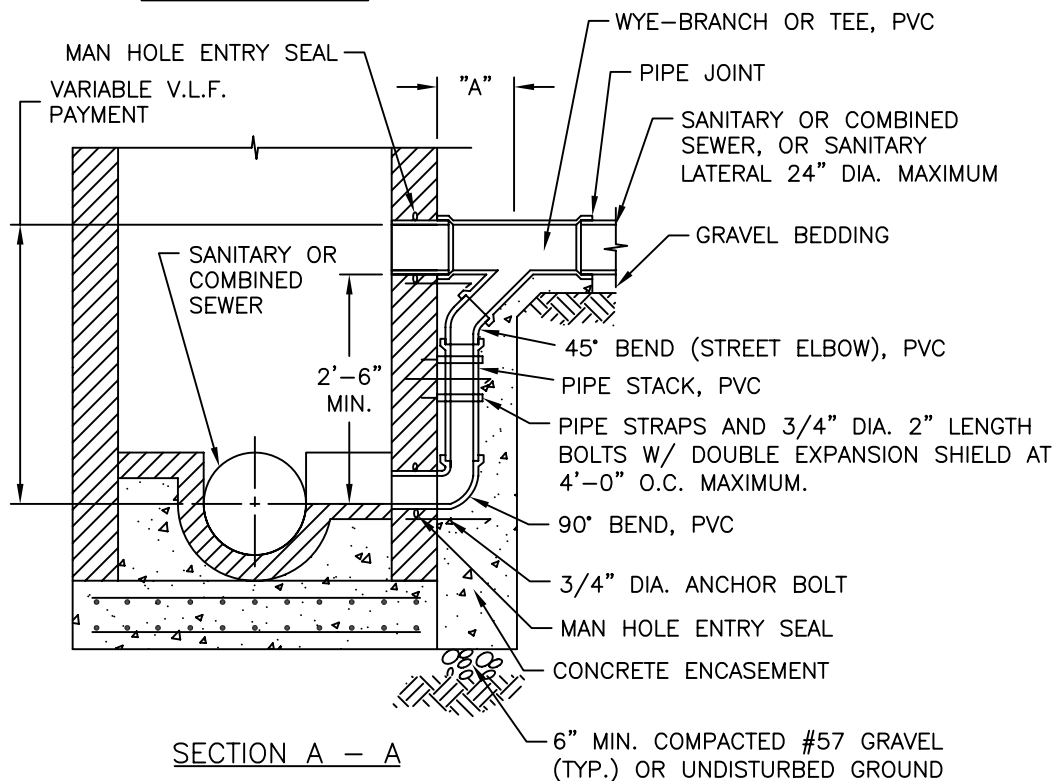
REVISION NO.: 0
 DATE: 6/20/03
 PREPARED BY: OBG/BKJV
 CHECKED BY: W.DARROW

STANDARD DETAIL
 CAST IN PLACE CONCRETE MANHOLE BASE
 ON EXISTING
 2'-0" X 3'-0" SEWERS



SECTIONAL PLAN
BRICK MANHOLE

SEWER OR LATERAL DIAMETER	STACK PIPE DIAMETER	DIMENSIONS "A" & "B"
4"	4"	16"
6"	6"	18"
8"	8"	20"
10"	10"	22"
12"	10"	22"
15"	12"	24"
18"	15"	27"
21"	18"	30"
24"	21"	33"



SECTION A - A

NOTES:

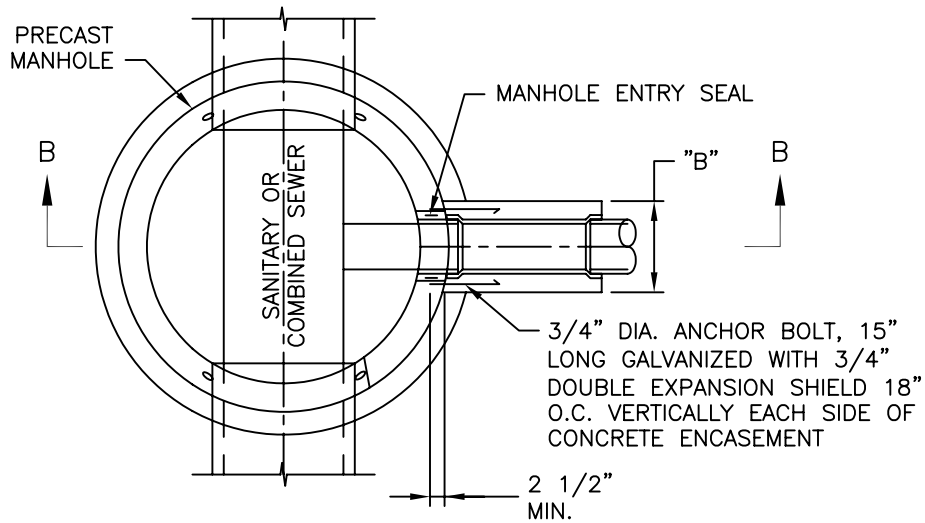
1. OUTSIDE FLOW DIVERTER SHALL BE USED FOR ALL DROP MANHOLES UNLESS OTHERWISE SPECIFIED OR SHOWN ON DRAWINGS
2. IF APPROVED BY WASA, WHEN THE DISTANCE BETWEEN THE INVERT OF THE MANHOLE AND THE TOP OF OF THE BENCH IS LESS THAN 2'-6", THE STACK PIPE CAN BE INSTALLED AT THE TOP OF THE BENCH
3. ALL CONCRETE TO BE CLASS 4000, AIR ENTRAINED, TYPE II CEMENT.

APPROVED DATE: June 20, 2003

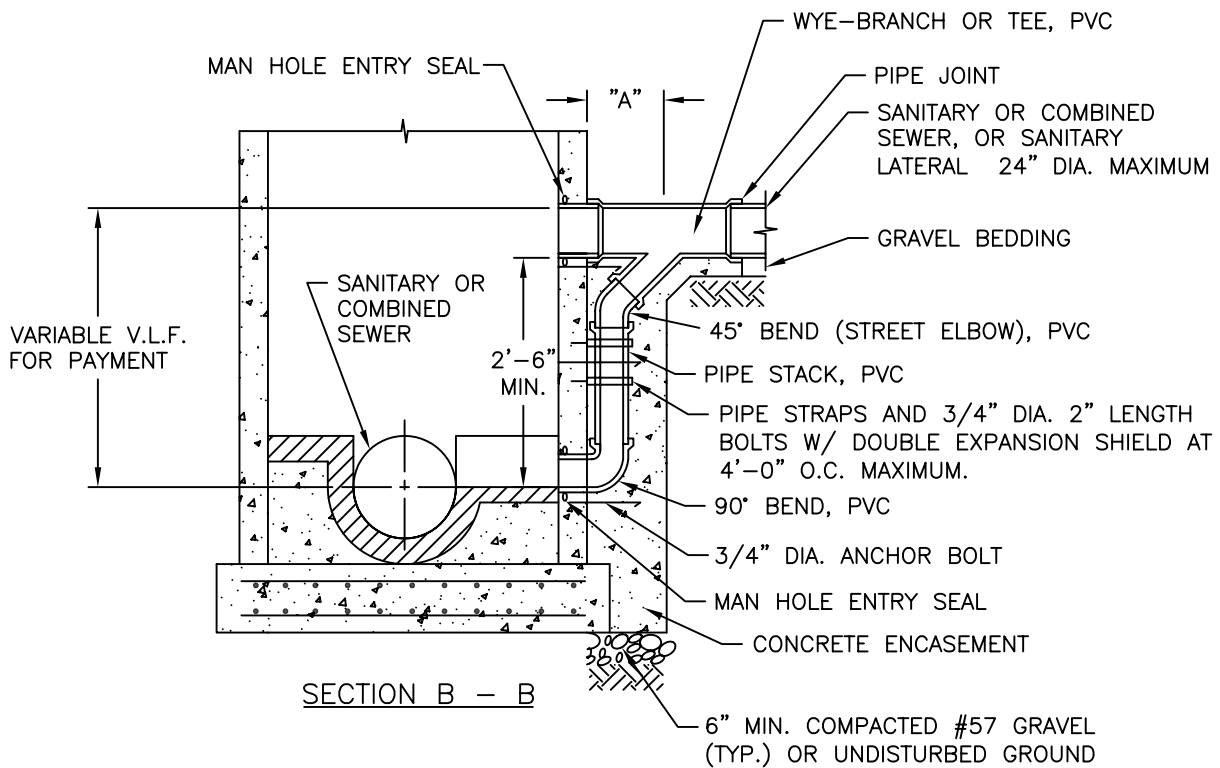
DIRECTOR, DEPARTMENT OF ENGINEERING
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REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL
BRICK
DROP MANHOLE
FLOW DIVERT OUTSIDE



SECTIONAL PLAN
PRECAST MANHOLE



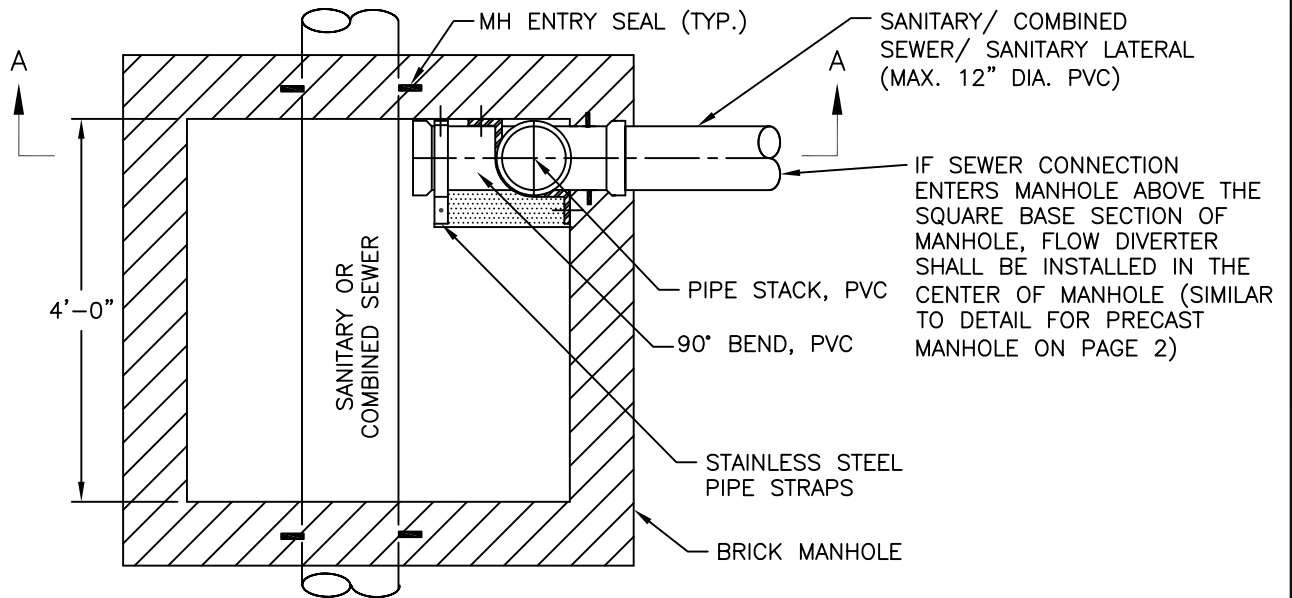
SECTION B - B

APPROVED DATE: June 20, 2003

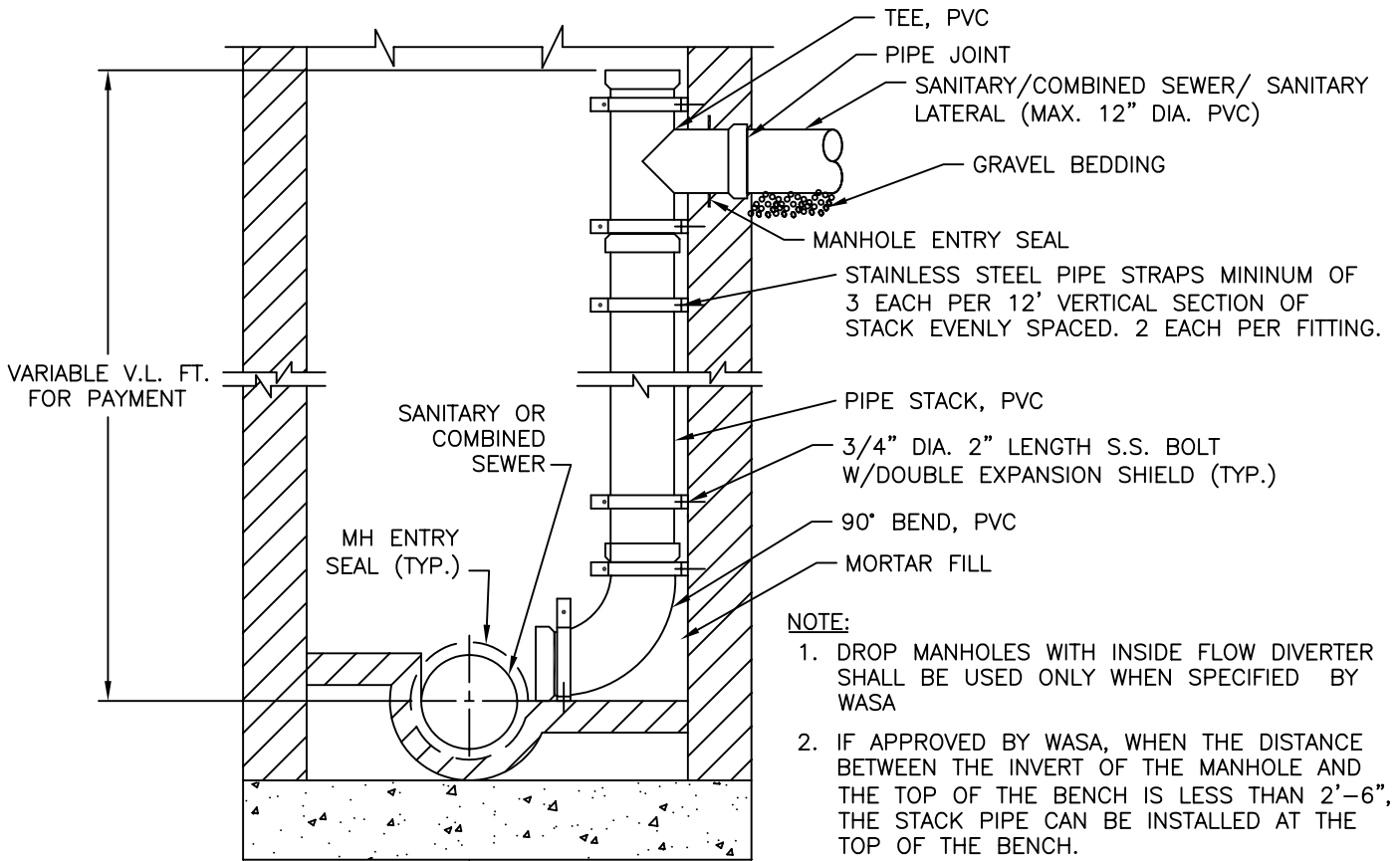
DIRECTOR, DEPARTMENT OF ENGINEERING
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REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: PRECAST
CHECKED BY: W.DARROW

STANDARD DETAIL
PRECAST
DROP MANHOLE
FLOW DIVERTER OUTSIDE



SECTIONAL PLAN
BRICK MANHOLE



SECTION A - A

- NOTE:**
1. DROP MANHOLES WITH INSIDE FLOW DIVERTER SHALL BE USED ONLY WHEN SPECIFIED BY WASA
 2. IF APPROVED BY WASA, WHEN THE DISTANCE BETWEEN THE INVERT OF THE MANHOLE AND THE TOP OF THE BENCH IS LESS THAN 2'-6", THE STACK PIPE CAN BE INSTALLED AT THE TOP OF THE BENCH.
 3. ALL CONCRETE TO BE CLASS 4000, AIR ENTRAINED, TYPE II CEMENT.

APPROVED DATE: June 20, 2003

REVISION NO.: 0

DATE: 6/20/03

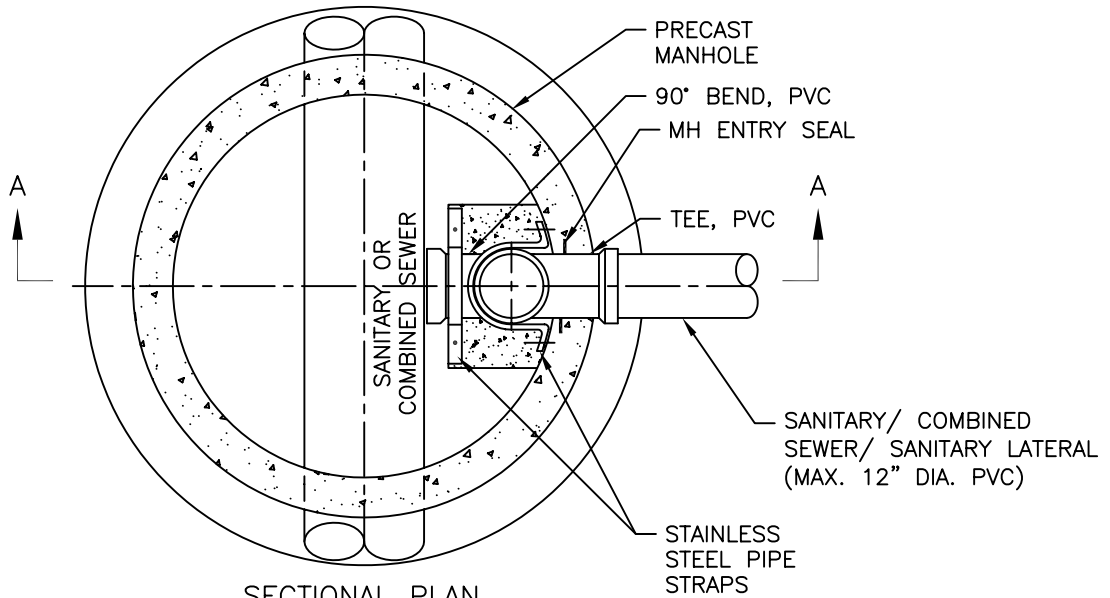
DIRECTOR, DEPARTMENT OF ENGINEERING
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PREPARED BY: OBG/BKJV

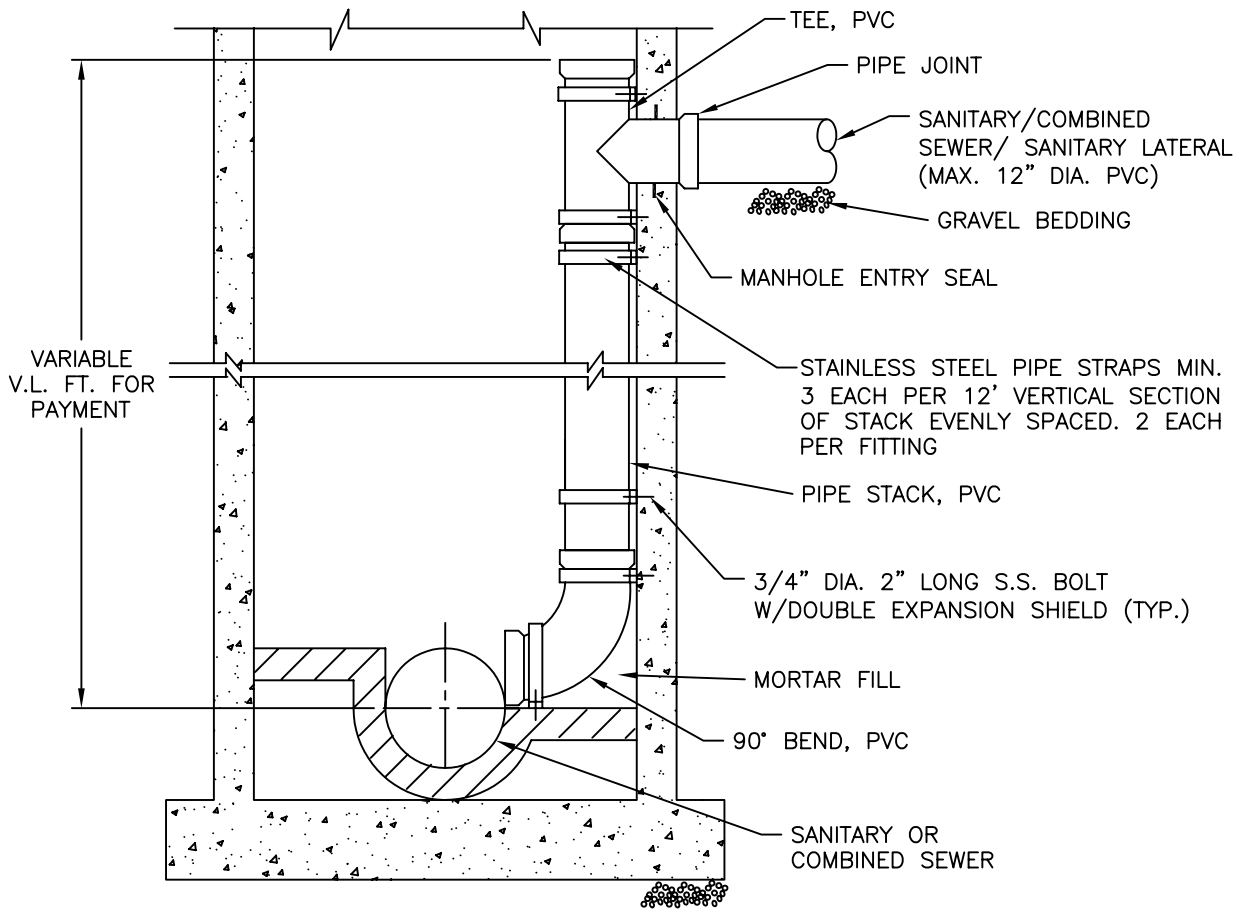
CHECKED BY: W.DARROW

STANDARD DETAIL

BRICK DROP MANHOLE
FLOW DIVERTER - INSIDE



SECTIONAL PLAN
PRECAST MANHOLE



SECTION A - A

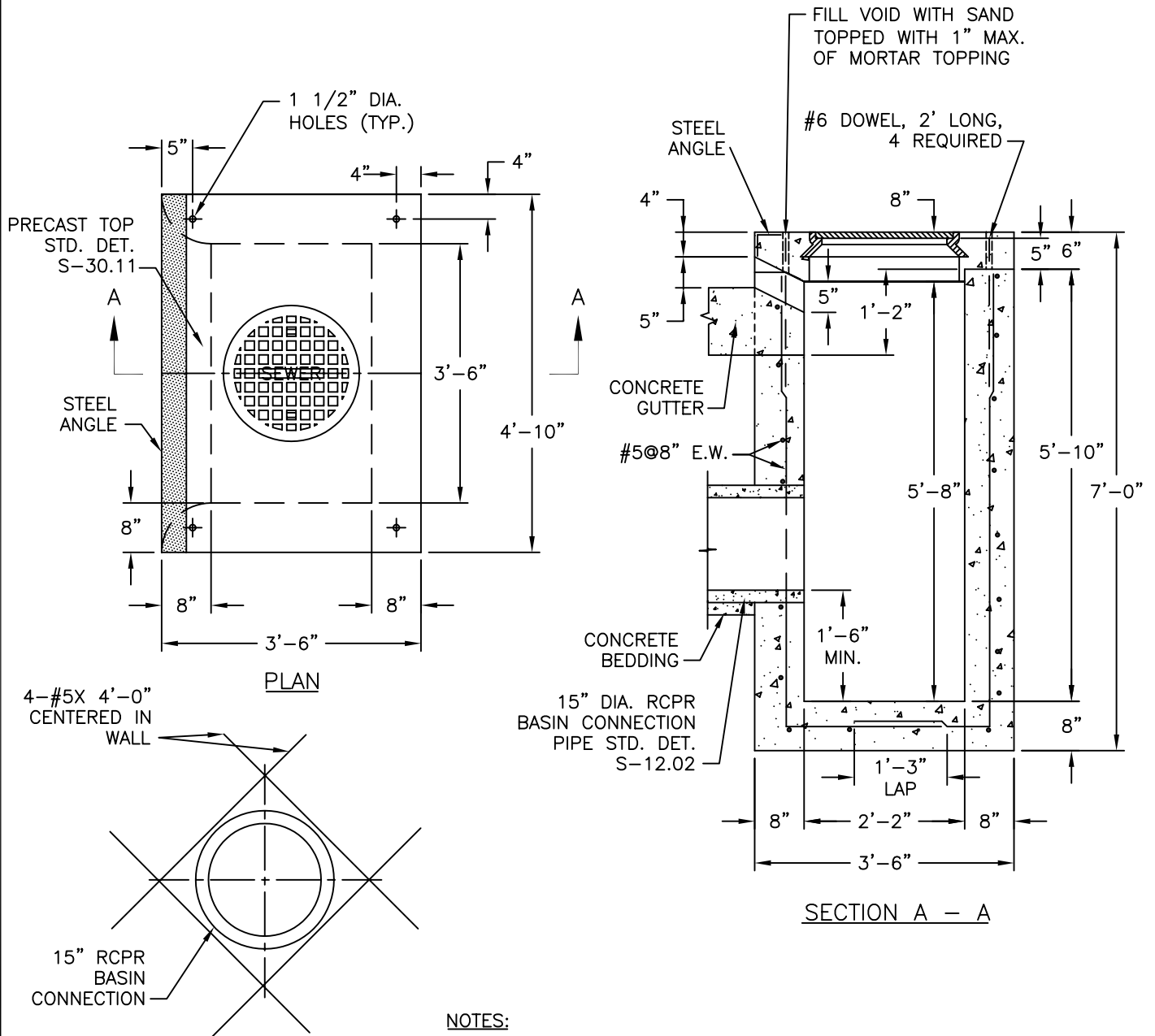
APPROVED DATE: June 20, 2003

DIRECTOR, DEPARTMENT OF ENGINEERING
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DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL

DROP MANHOLE
FLOW DIVERTER - INSIDE



NOTES:

1. ALL CONCRETE TO BE CLASS 4000, AIR ENTRAINED, TYPE II CEMENT
2. REINFORCING SHALL BE CENTERED IN WALLS AND BASE AND SHALL CONFORM TO ASTM AC15 GRADE 60.

APPROVED DATE: June 20, 2003

REVISION NO.: 0

DATE: 6/20/03

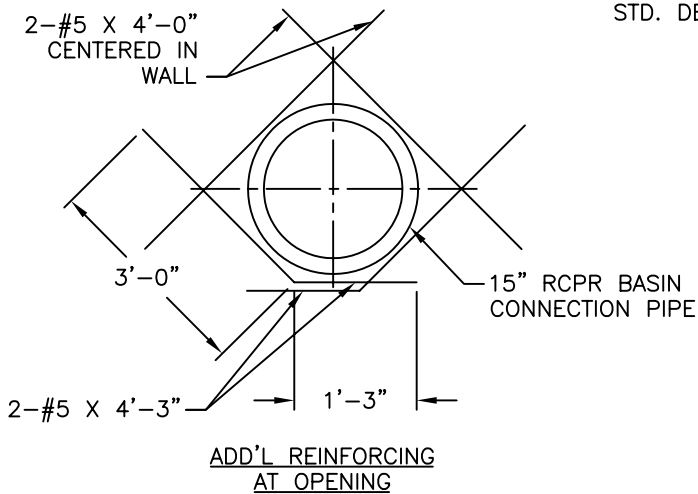
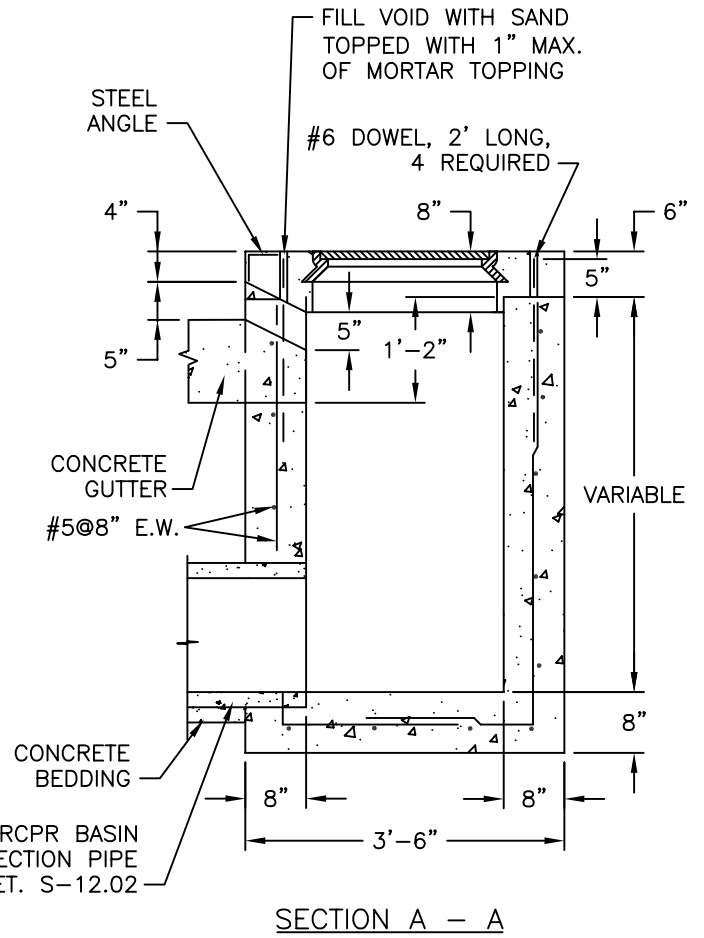
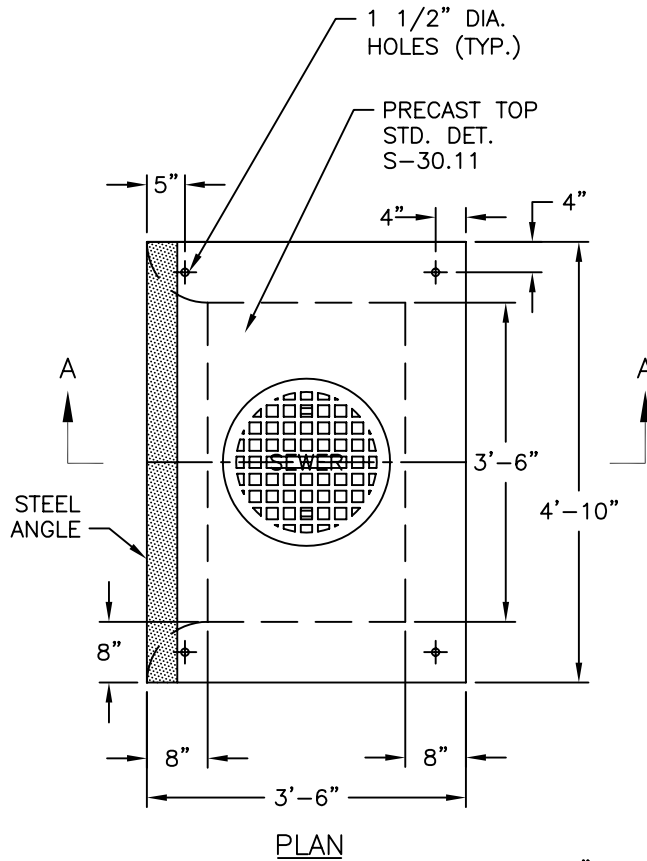
DIRECTOR, DEPARTMENT OF ENGINEERING AND TECHNICAL SERVICES

PREPARED BY: OBG/BKJV

CHECKED BY: W.DARROW

STANDARD DETAIL

STANDARD CATCH BASIN



NOTES:

1. ALL CONCRETE TO BE CLASS 4000, AIR ENTRAINED, TYPE II CEMENT
2. REINFORCING SHALL BE CENTERED IN WALLS AND BASE, AND SHALL CONFORM TO ASTM A615 GRADE 60.

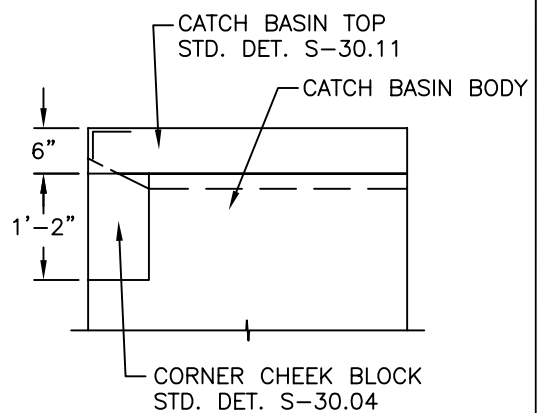
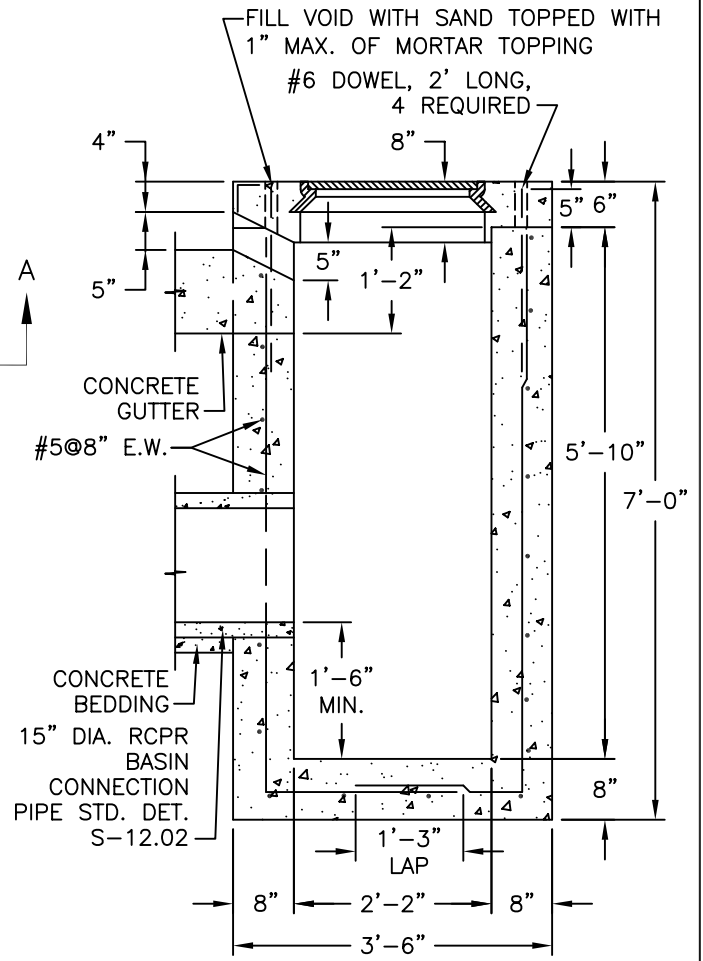
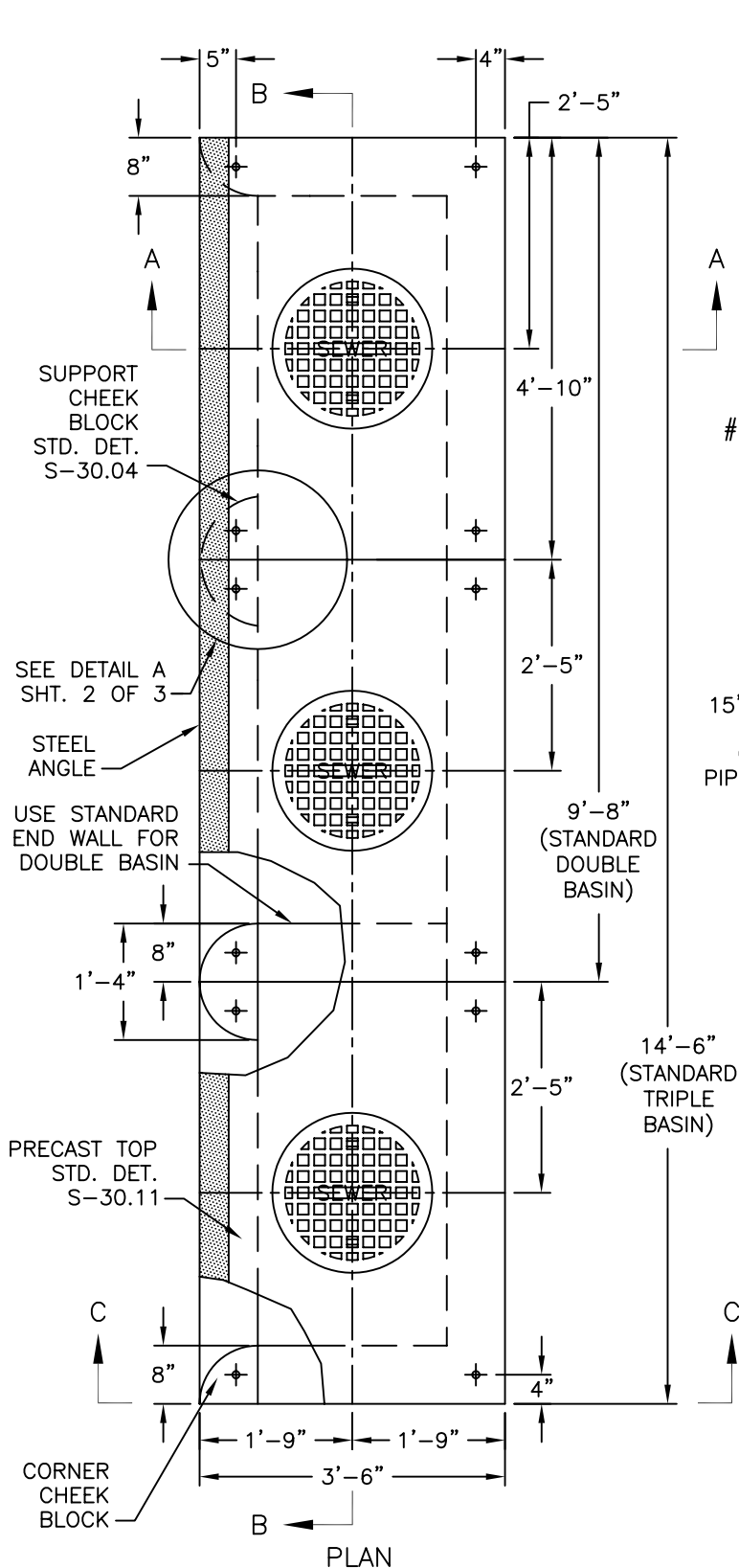
APPROVED DATE: June 20, 2003

DIRECTOR, DEPARTMENT OF ENGINEERING AND TECHNICAL SERVICES

REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL

CATCH BASIN WITHOUT CATCHMENT CHAMBER



- NOTES:
1. ALL CONCRETE TO BE CLASS 4000, AIR ENTRAINED, TYPE II CEMENT.
 2. REINFORCING STEEL SHALL CONFORM TO ASTM A615, GRADE 60.

APPROVED DATE: June 20, 2003

DIRECTOR, DEPARTMENT OF ENGINEERING AND TECHNICAL SERVICES

REVISION NO.: 0

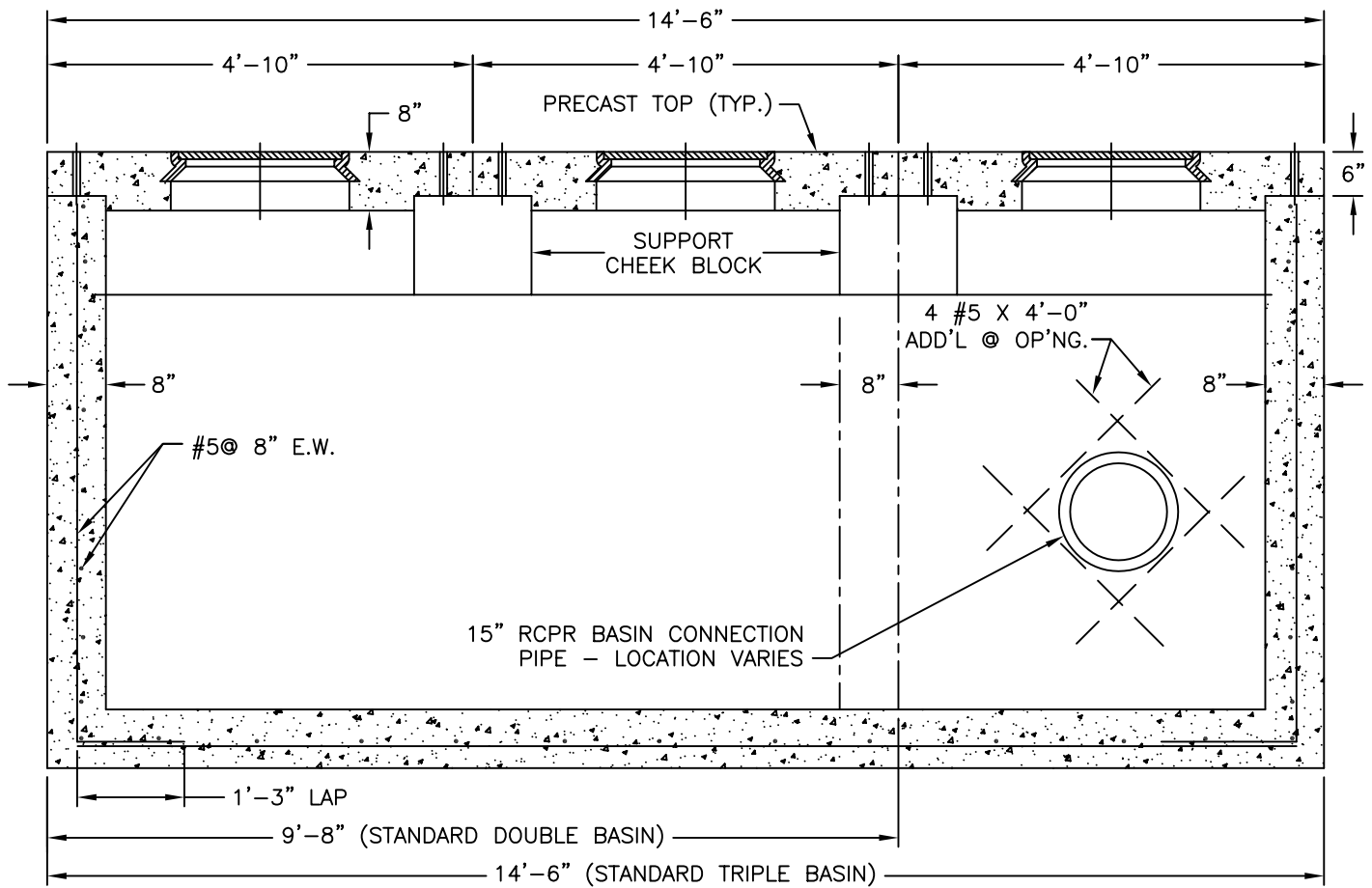
DATE: 6/20/03

PREPARED BY: OBG/BKJV

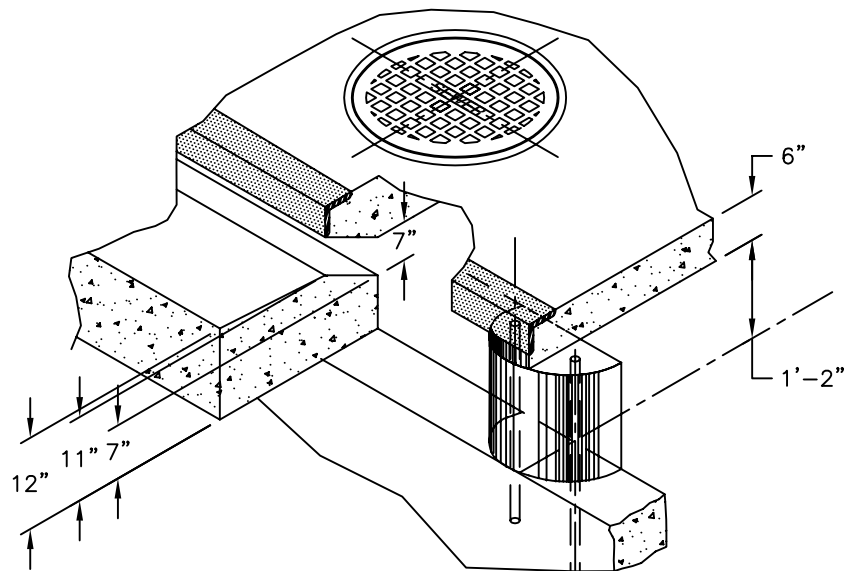
CHECKED BY: W.DARROW

STANDARD DETAIL

STANDARD DOUBLE AND STANDARD TRIPLE BASINS



SECTION B-B



DETAIL A

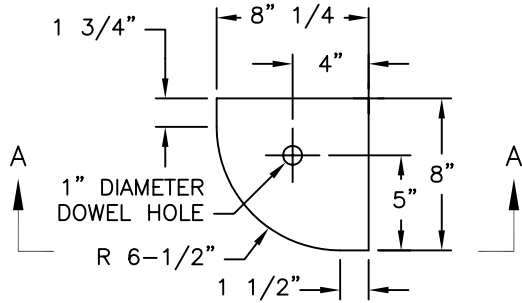
APPROVED DATE: June 20, 2003

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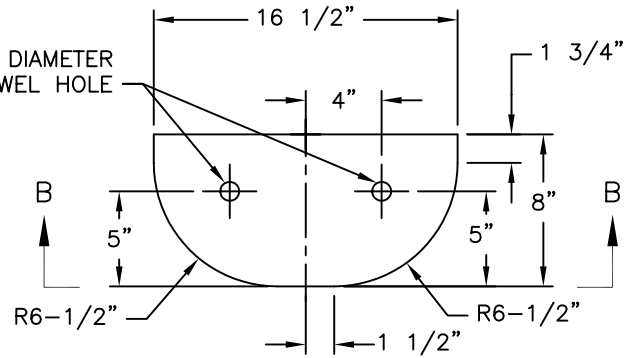
REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL

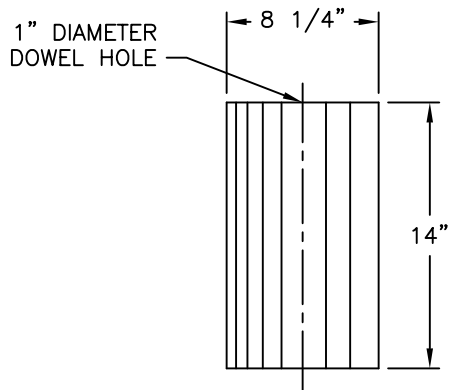
STANDARD DOUBLE AND
STANDARD TRIPLE BASINS



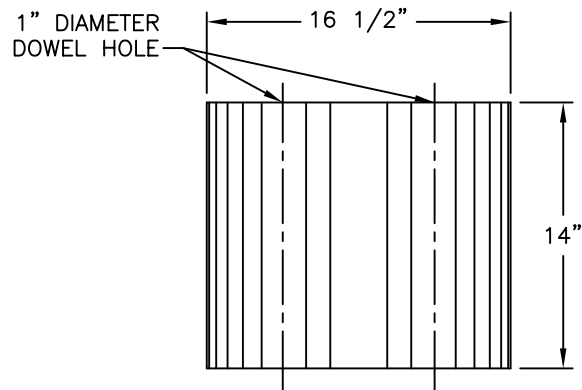
PLAN - CORNER CHEEK BLOCK



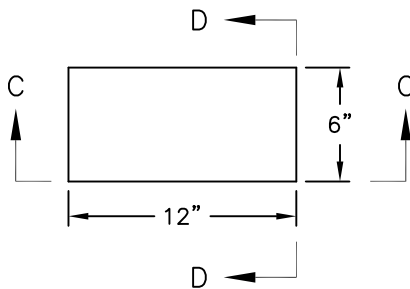
PLAN - SUPPORT CHEEK BLOCK



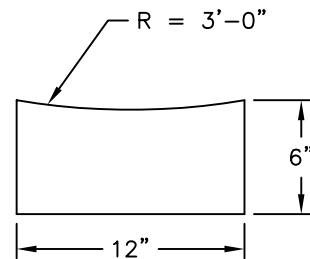
SECTION A - A



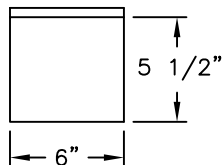
SECTION B - B



PLAN - SADDLE BLOCK



SECTION C - C



SECTION D - D

NOTES:

1. SEE SPECIFICATIONS
2. CLASS 4000 CONCRETE, AIR ENTRAINMENT, TYPE II CEMENT.

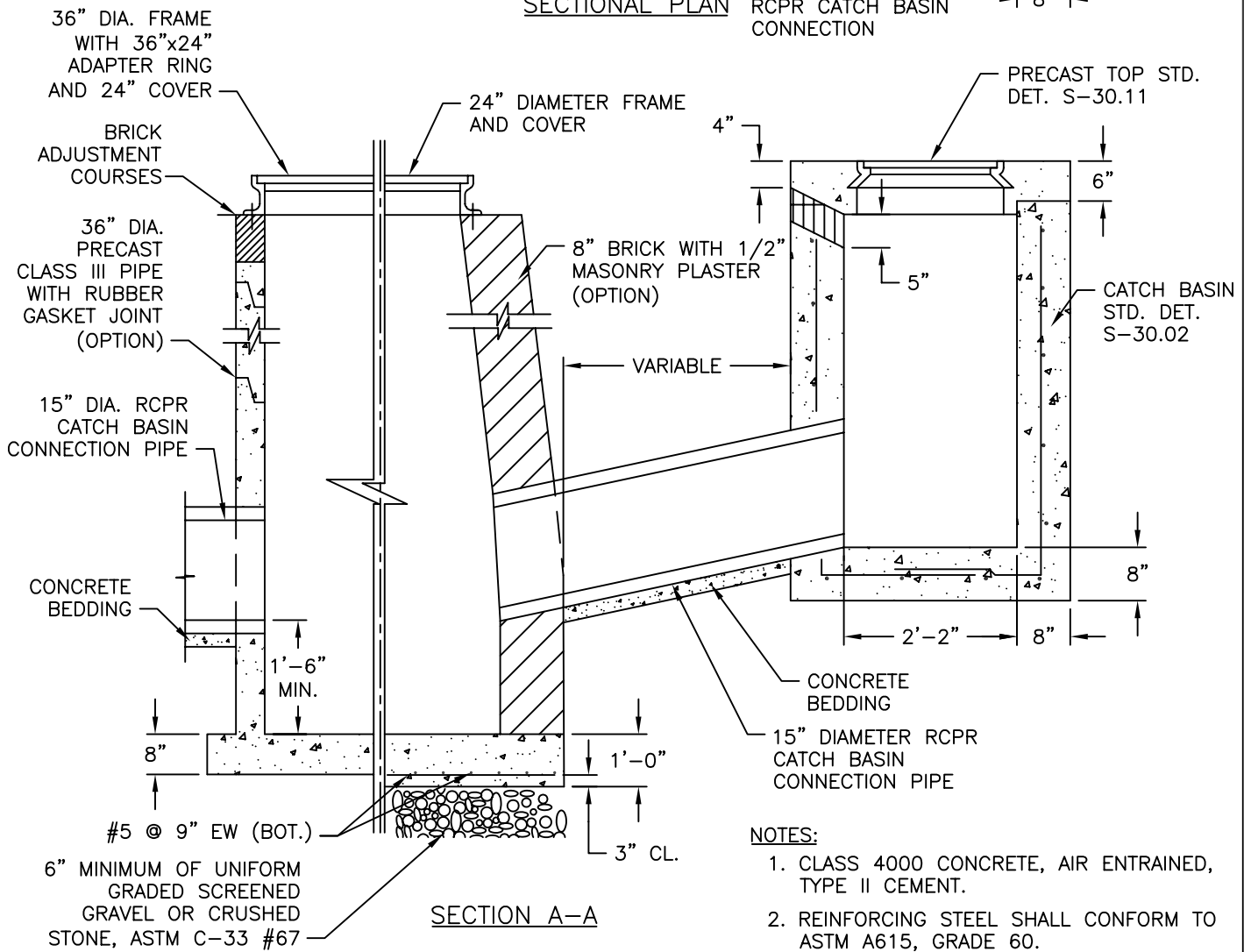
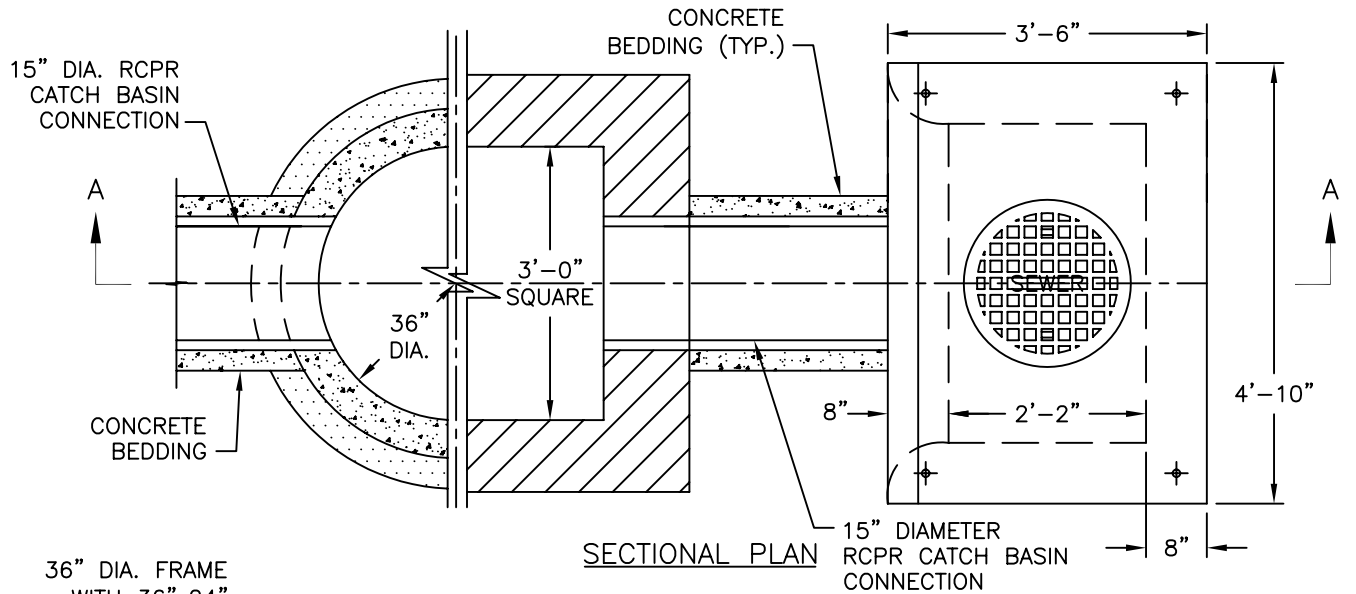
APPROVED DATE: June 20, 2003

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REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL

DETAILS FOR CHEEK BLOCKS
AND SADDLE BLOCKS



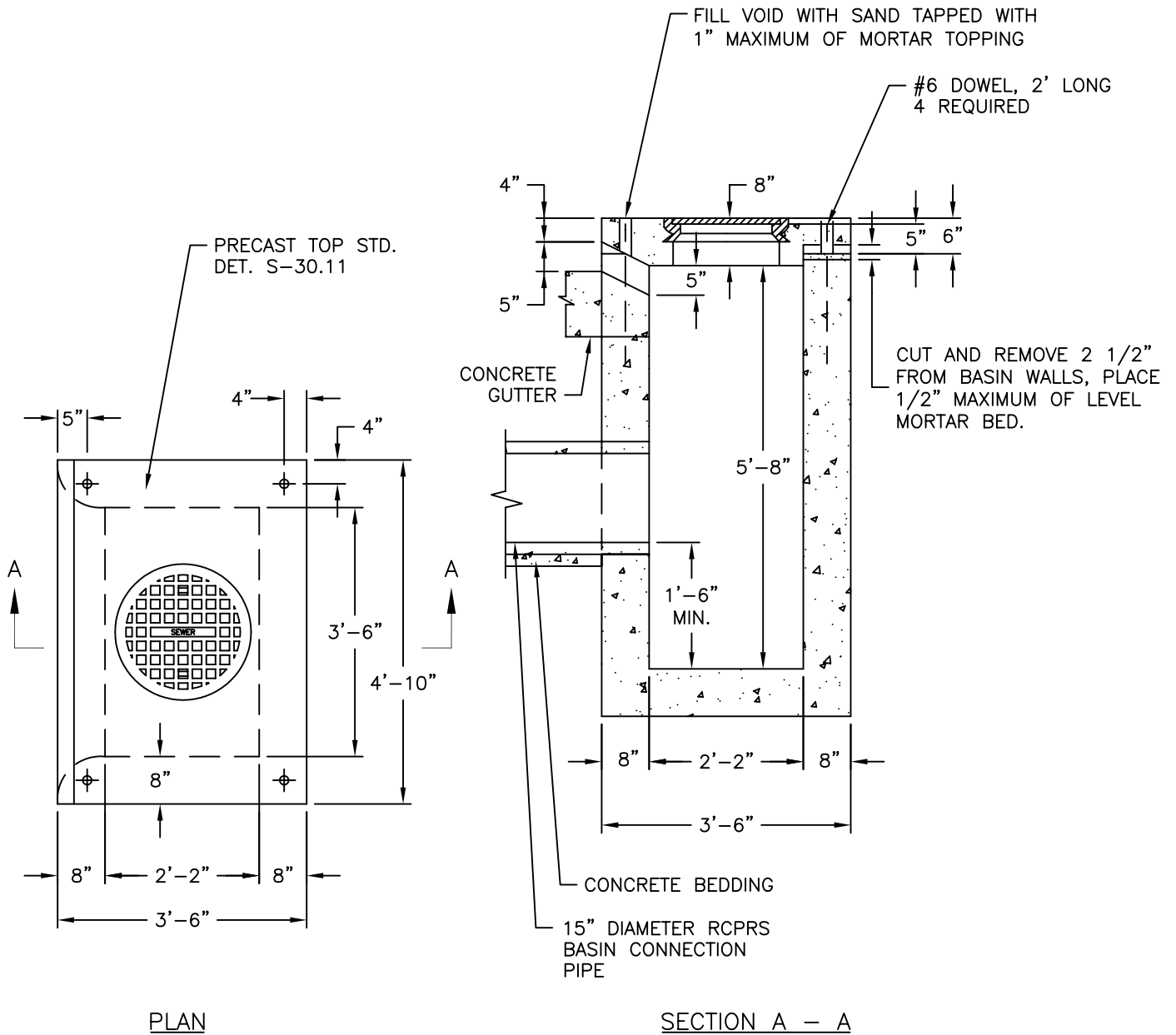
APPROVED DATE: June 20, 2003

DIRECTOR, DEPARTMENT OF ENGINEERING
AND TECHNICAL SERVICES

REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL

SHALLOW TYPE CATCH BASIN
WITH CATCHMENT MANHOLE



NOTE:

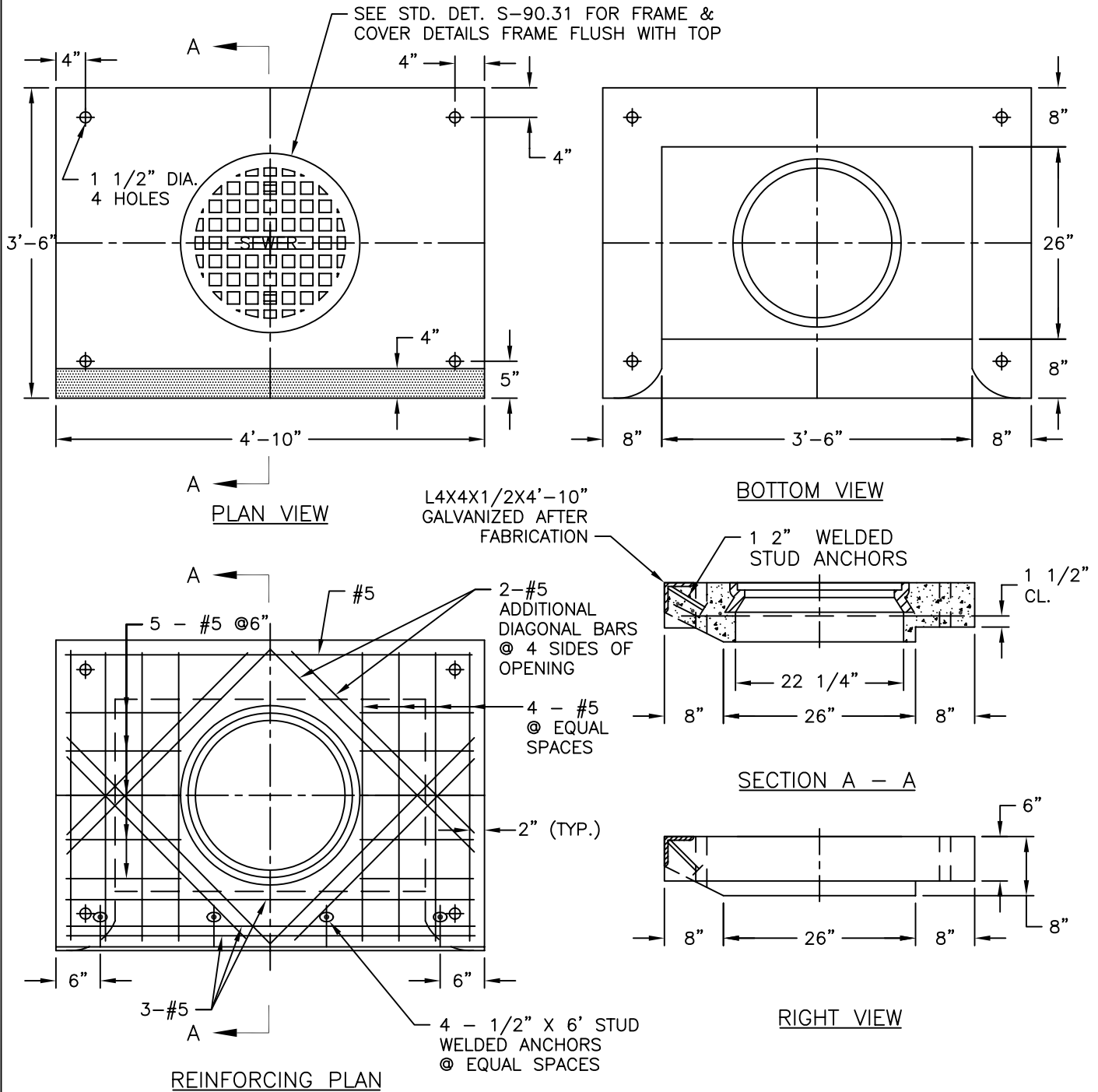
ALL CONCRETE TO BE CLASS 4000, AIR ENTRAINED,
TYPE II CEMENT.

APPROVED DATE: June 20, 2003

DIRECTOR, DEPARTMENT OF ENGINEERING
AND TECHNICAL SERVICES

REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL
STANDARD CATCH BASIN MODIFICATION FOR
PLACEMENT OF 8" PRECAST STANDARD CATCH
BASIN TOP



NOTES:

1. SEE SPECIFICATIONS
2. CLASS 4000 CONCRETE, AIR ENTRAINED, TYPE II CEMENT.
3. REINFORCING STEEL, ASTM A615, GRADE 60, 1 1/2" CLEAR COVER UNLESS NOTED
4. STEEL ANGLE PER ASTM A36, GALVANIZED PER ASTM A123
5. STUD ANCHORS SHALL BE LOW CARBON STEEL, ASTM A108, TYPE H4L NELSON HEADED ANCHORS WITH FLUXED ENDS, BY NELSON STUD WELDING CO. OR APPROVED EQUAL

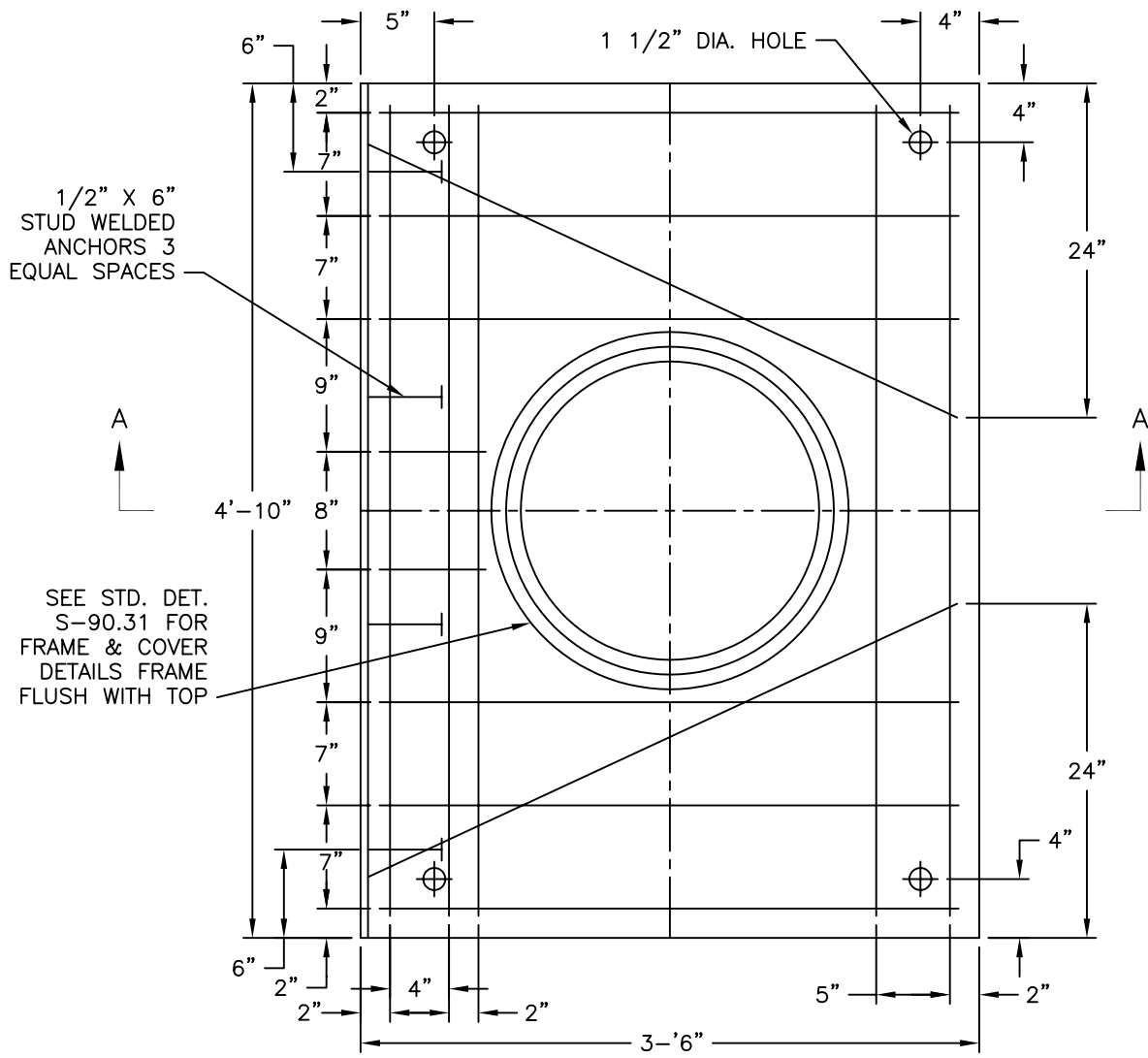
APPROVED DATE: June 20, 2003

DIRECTOR, DEPARTMENT OF ENGINEERING
AND TECHNICAL SERVICES

REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

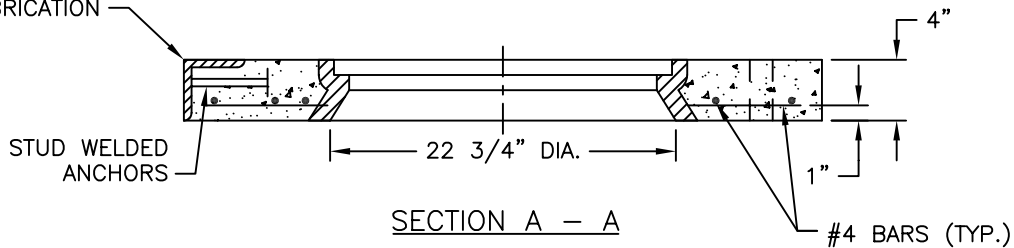
STANDARD DETAIL

8" PRECAST STANDARD
CATCH BASIN TOP



SECTIONAL PLAN

L4 X 4 1/2 X
4'-10" GALVANIZED
AFTER FABRICATION



SECTION A - A

NOTES:

1. CLASS 4000 CONCRETE, AIR ENTRAINED, TYPE II CEMENT
2. REINFORCING STEEL, ASTM A615, GRADE 60
3. STEEL ANGLE PER ASTM A36, GALVANIZED PER ASTM A123
4. STUD ANCHORS SHALL BE LOW CARBON STEEL, ASTM A108, TYPE H4L NELSON HEADED ANCHORS WITH FLUXED ENDS, BY NELSON STUD WELDING CO. OR APPROVED EQUAL

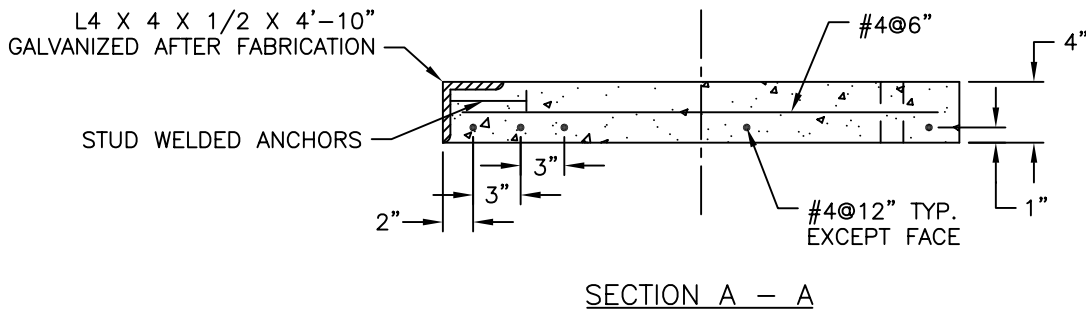
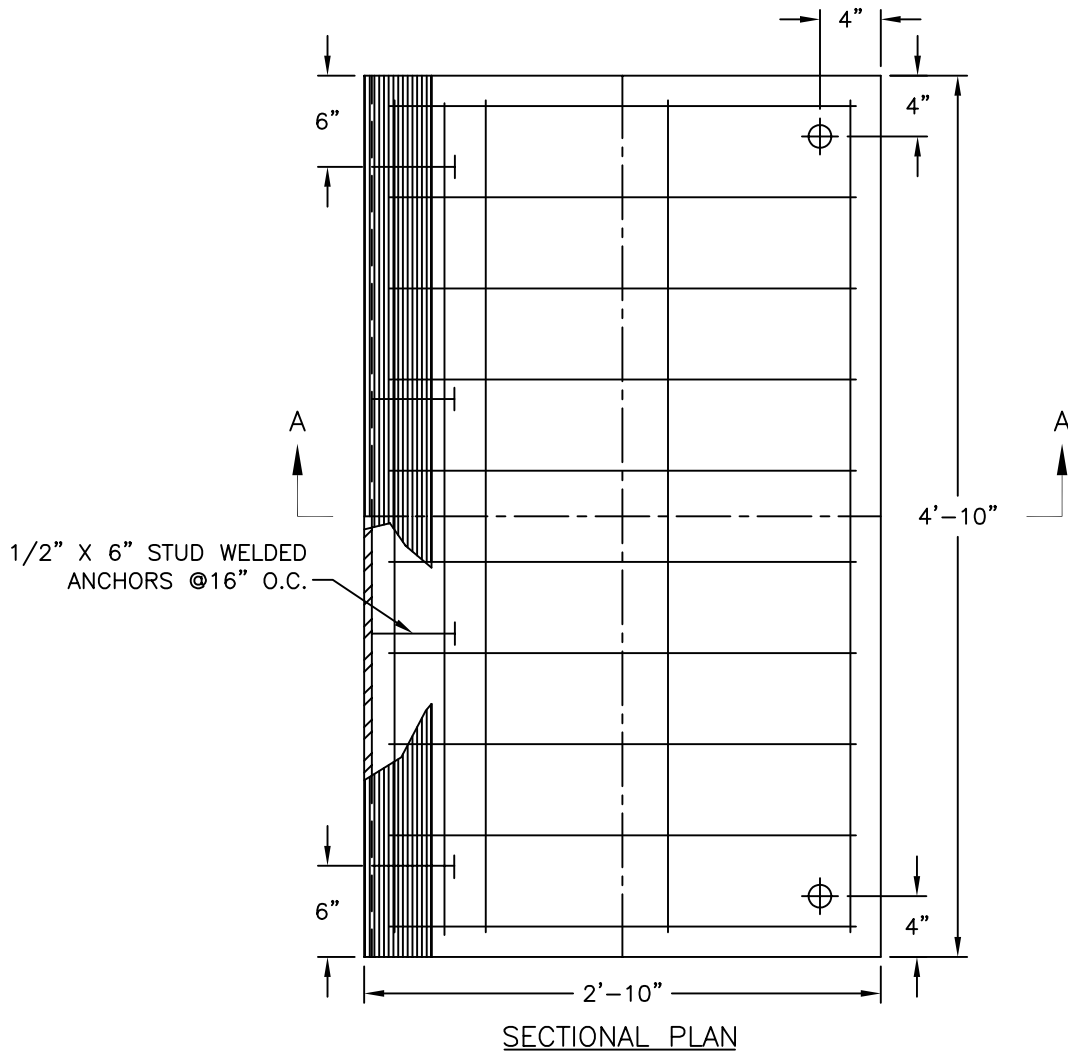
APPROVED DATE: June 20, 2003

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DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL

4" PRECAST STANDARD CATCH BASIN TOP
(FOR REPLACEMENT ONLY)



NOTES:

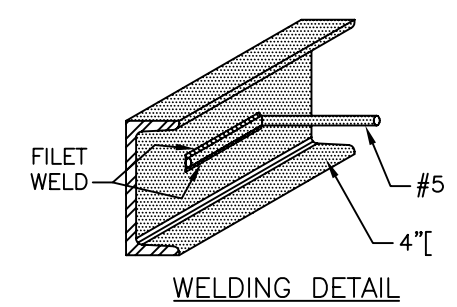
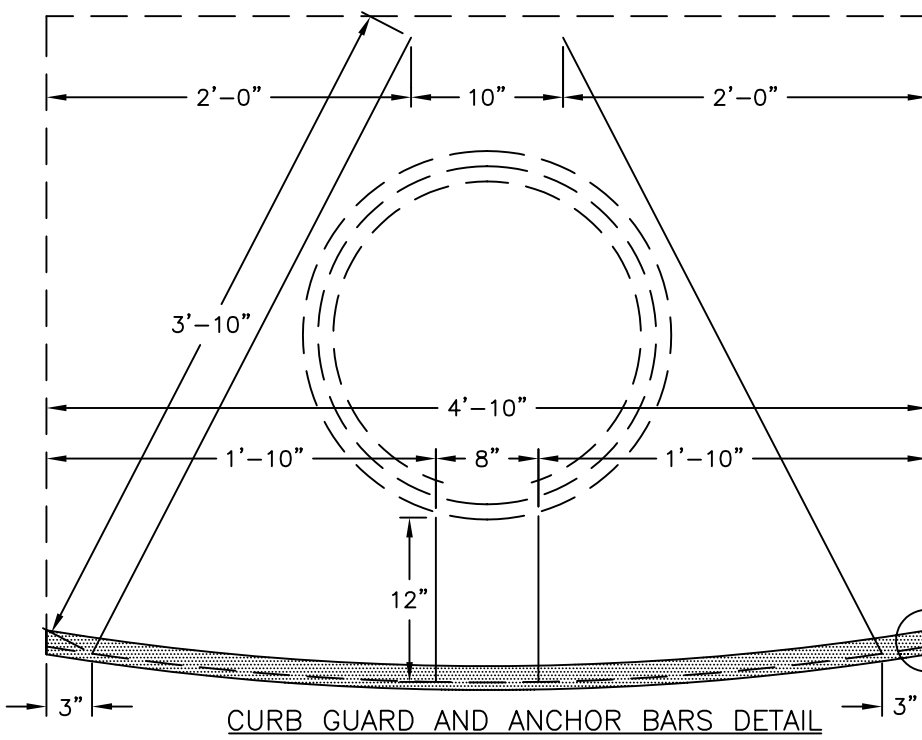
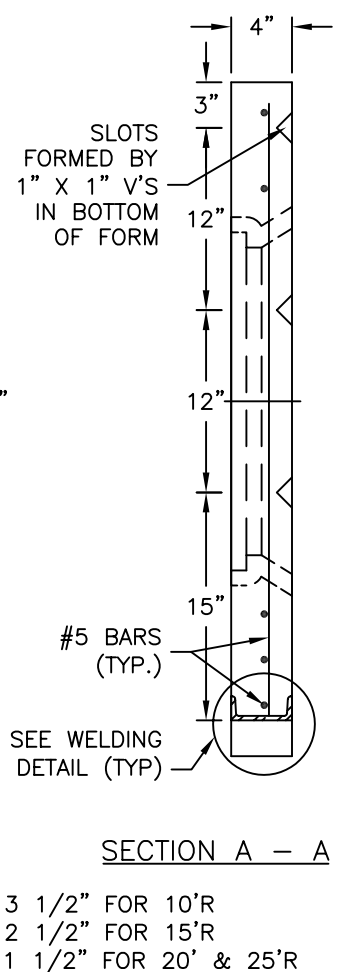
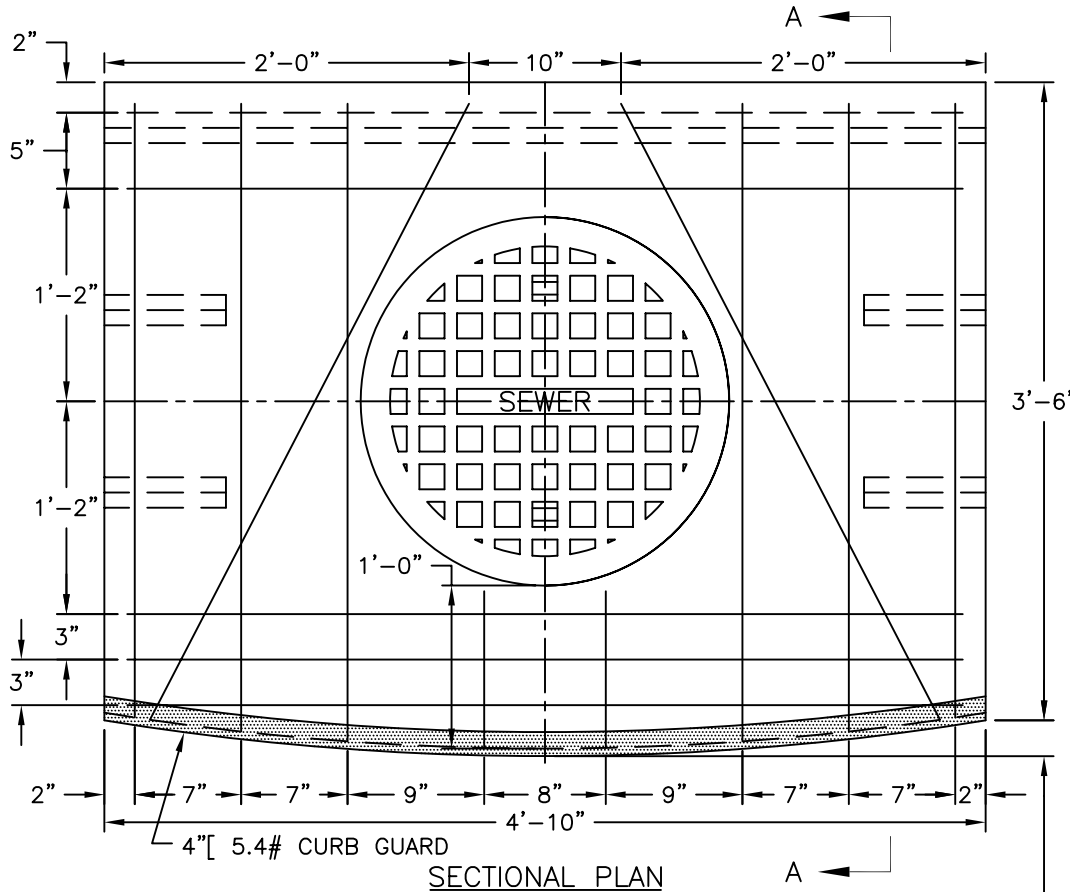
1. CLASS 4000 CONCRETE, AIR ENTRAINED, TYPE II CEMENT
2. REINFORCING STEEL, ASTM A615, GRADE 60
3. STEEL ANGLE PER ASTM A36, GALVANIZED PER ASTM A123
4. STUD ANCHORS SHALL BE LOW CARBON STEEL, ASTM A108, TYPE H4L NELSON HEADED ANCHORS WITH FLUXED ENDS, BY NELSON STUD WELDING CO. OR APPROVED EQUAL

APPROVED DATE: June 20, 2003

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REVISION NO.: 0
 DATE: 6/20/03
 PREPARED BY: OBG/BKJV
 CHECKED BY: W.DARROW

STANDARD DETAIL
 4" PRECAST CATCH BASIN
 ELONGATION TOP
 (FOR REPLACEMENT ONLY)



- NOTES:
1. ALL CONCRETE TO BE CLASS 4000, AIR ENTRAINED
 2. REINFORCING STEEL ASTM A615, GRADE 60
 3. STEEL CHANNEL PER ASTM A36, GALVANIZED PER ASTM A123
- SEE WELDING DETAIL (TYP.)

APPROVED DATE: June 20, 2003

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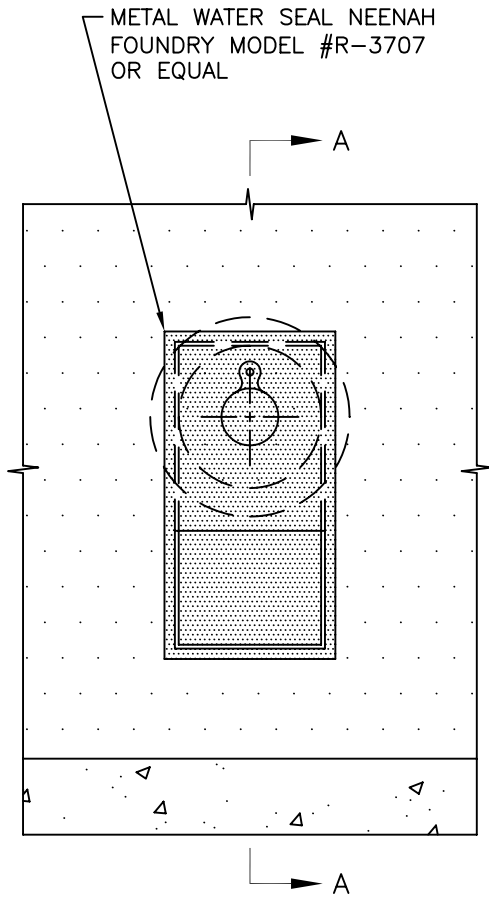
DATE: 6/20/03

PREPARED BY: OBG/BKJV

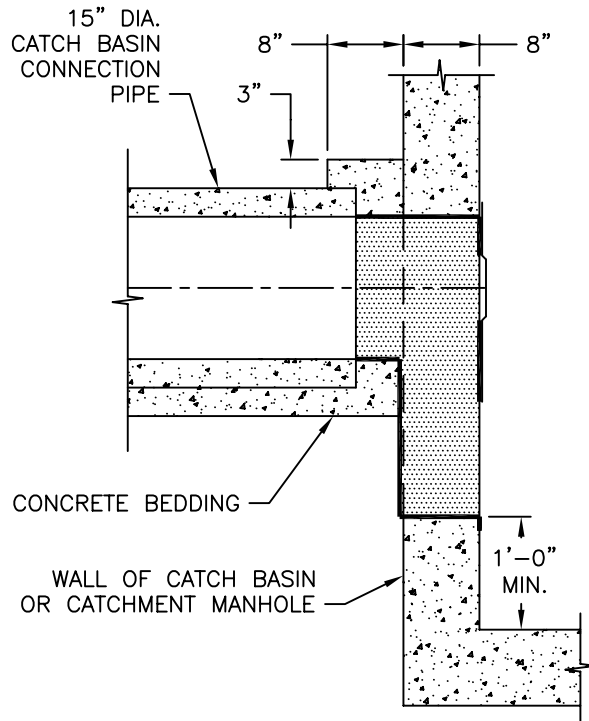
CHECKED BY: W.DARROW

STANDARD DETAIL

PRECAST CORNER CATCH BASIN TOP
(FOR REPLACEMENT ONLY)



FRONT ELEVATION



SECTION A-A

NOTES:

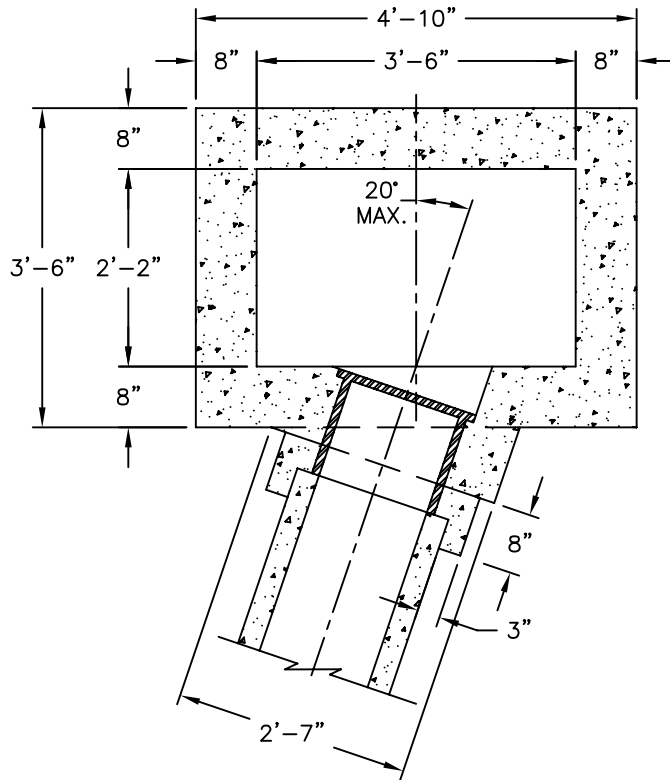
1. GRAY IRON CASTINGS PER ASTM A-48, CLASS 30A.
2. ALL MACHINE FINISH TO BE A.S.A. SPECIFICATION, ROUGHNESS SYMBOL 250, TOLERANCE $-0" +1/16"$.
3. WHEN THE CATCH BASIN CONNECTION PIPE IS NOT PERPENDICULAR TO THE CATCH BASIN WALL, THE WALL SHALL BE MODIFIED TO INSTALL WATER SEAL ON SAME ALIGNMENT AS THE CATCH BASIN PIPE, SEE SECTIONAL PLAN, SHEET 2 OF 2 FOR TYPICAL DETAIL.

APPROVED DATE: June 20, 2003

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REVISION NO.: 0
 DATE: 6/20/03
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STANDARD DETAIL
 WATER SEAL FOR 15" DIAMETER
 CATCH BASIN CONNECTION
 (COMBINED AREA ONLY)



SECTIONAL PLAN

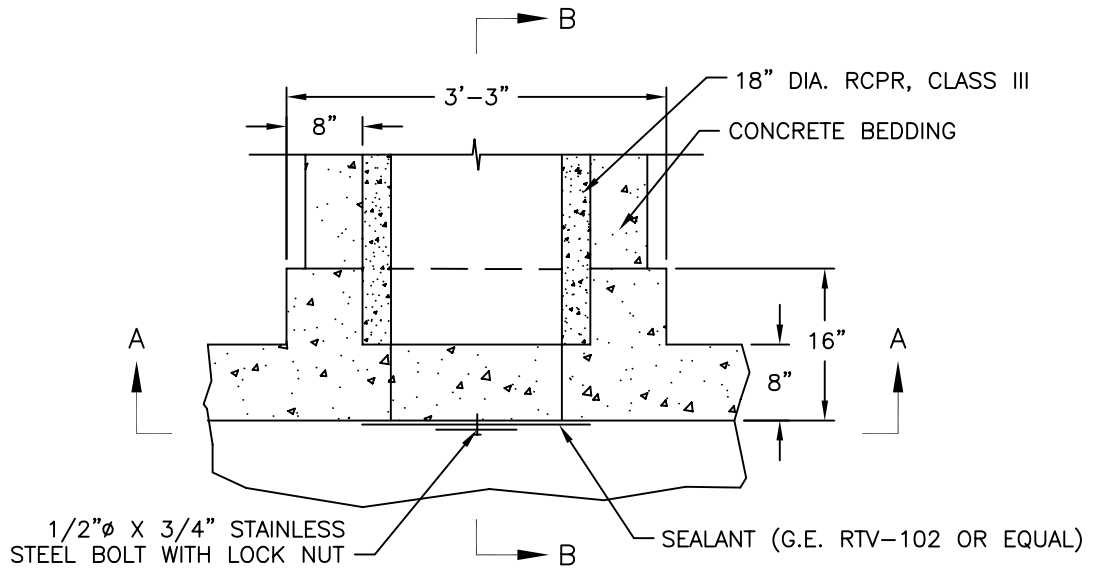
APPROVED DATE: June 20, 2003

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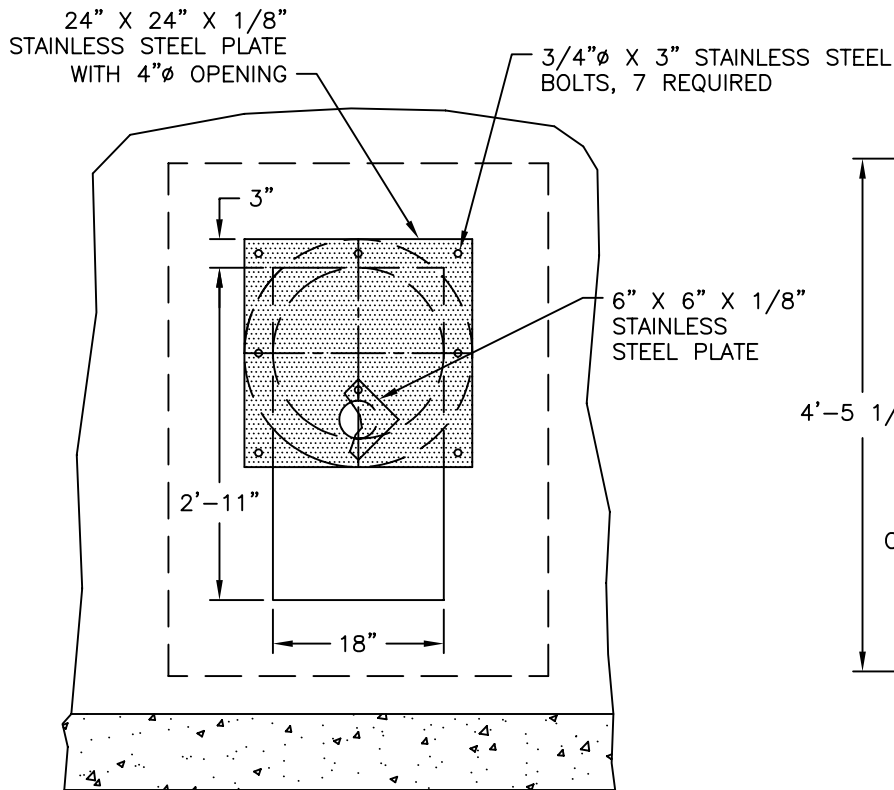
REVISION NO.: 0
 DATE: 6/20/03
 PREPARED BY: OBG/BKJV
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STANDARD DETAIL

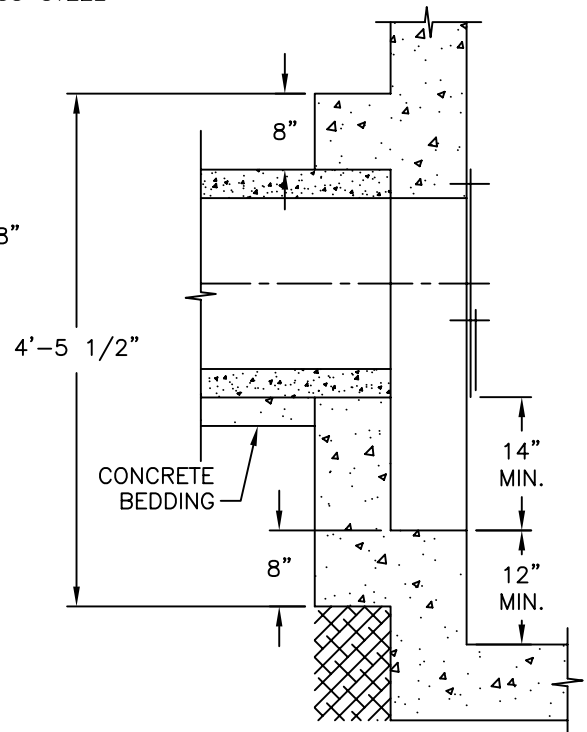
TYPICAL FOR NON-PERPENDICULAR
 CATCH BASIN CONNECTION PIPE



SECTIONAL PLAN



SECTION A-A



SECTION B-B

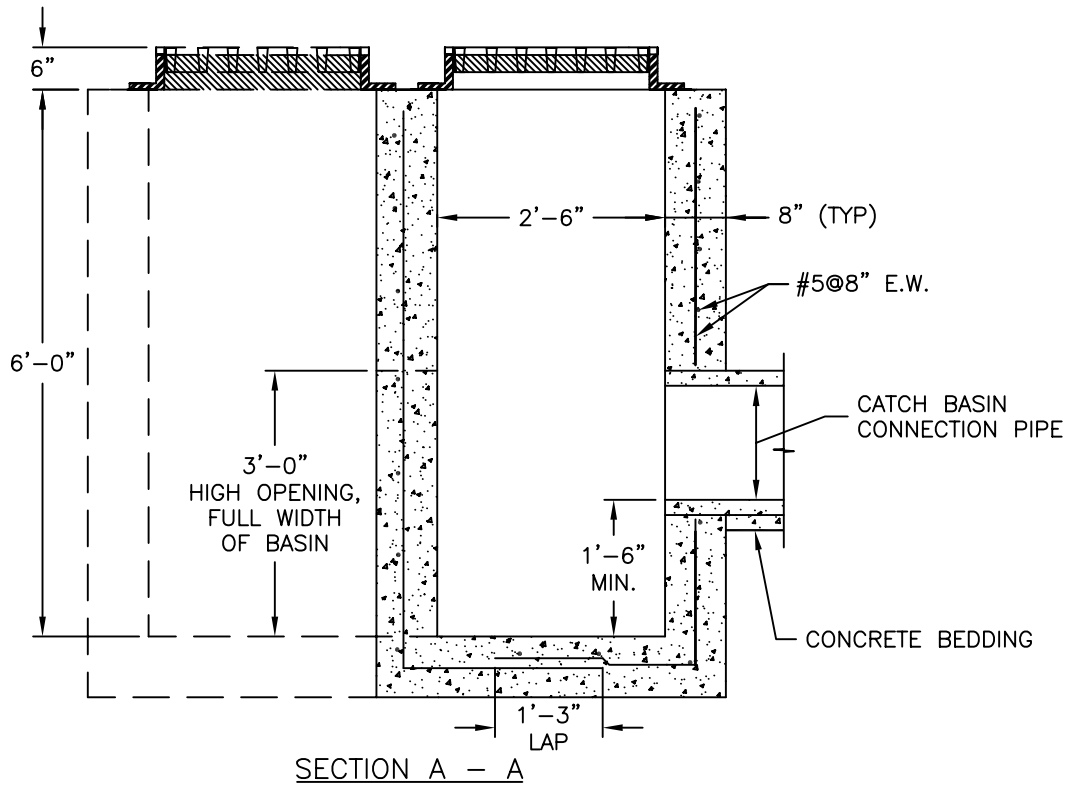
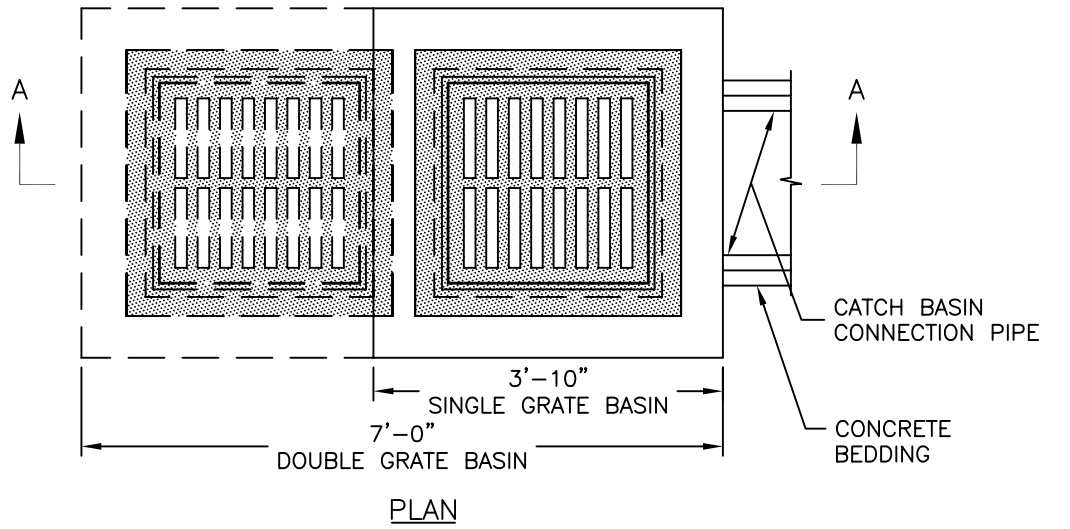
APPROVED DATE: June 20, 2003

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REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL
WATER SEAL FOR 18" DIAMETER
CATCH BASIN CONNECTION
(COMBINED SYSTEM ONLY)

C.I. FRAME AND GRATE
NEENAH FOUNDRY R-3350



NOTES:

1. GRAY IRON CASTING PER ASTM A-48, CLASS 30A.
2. ALL MACHINE FINISH TO BE A.S.A. SPECIFICATION, ROUGHNESS SYMBOL 250, TOLERANCE $-0 + 1/16"$.
3. ALL CONCRETE TO BE CLASS 4000, AIR ENTRAINED TYPE II CEMENT.
4. BASIN TO BE USED IN UNPAVED AREAS ONLY.
5. REINFORCING SHALL BE CENTERED IN WALL AND BASE AND SHALL CONFORM TO ASTM A615 GRADE 60.

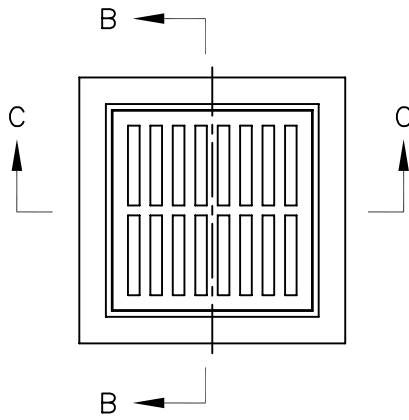
APPROVED DATE: June 20, 2003

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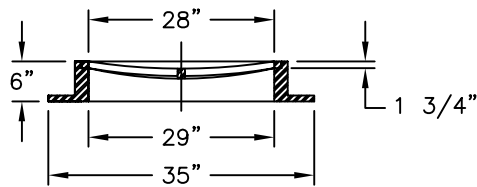
REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL

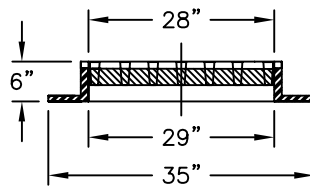
FIELD INLET
GRATE TYPE CATCH BASIN



PLAN



SECTION B - B



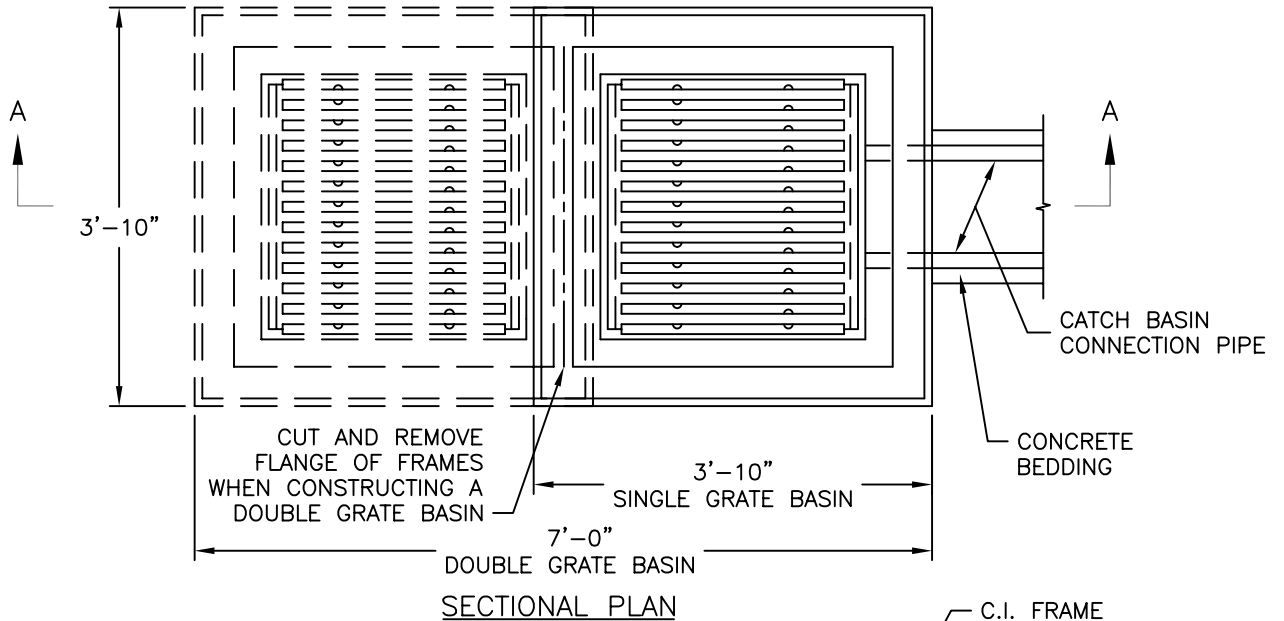
SECTION C - C

APPROVED DATE: June 20, 2003

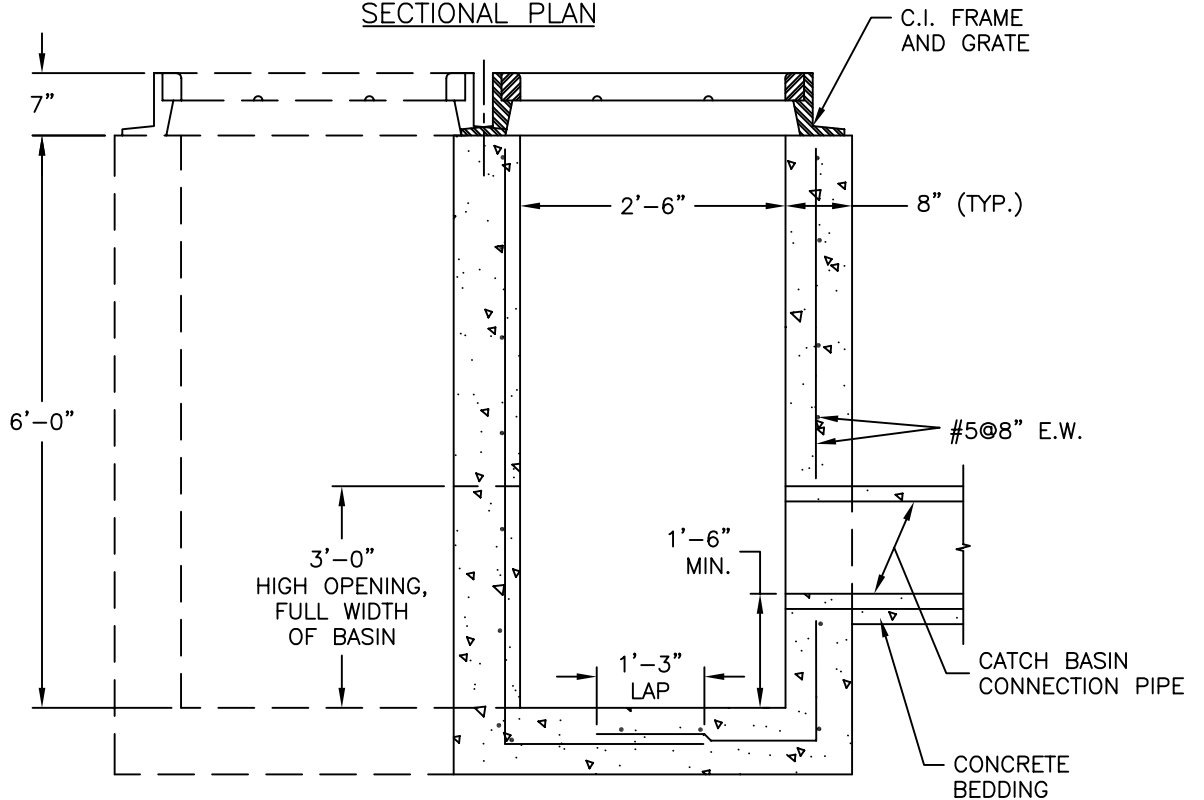
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REVISION NO.: 0
 DATE: 6/20/03
 PREPARED BY: OBG/BKJV
 CHECKED BY: W.DARROW

STANDARD DETAIL
 FIELD INLET
 GRATE TYPE CATCH BASIN



SECTIONAL PLAN



SECTION A - A

NOTES:

1. GRAY IRON CASTINGS PER ASTM A-48, CLASS 30A.
2. ALL MACHINE FINISH TO BE A.S.A. SPECIFICATION, ROUGHNESS SYMBOL 250, TOLERANCE - 0 + 1/16".
3. ALL CONCRETE TO BE CLASS 4000, AIR ENTRAINED, TYPE II CEMENT.
4. REINFORCING SHALL BE CENTERED IN WALL AND BASE AND SHALL CONFORM TO ASTM A615 GRADE 60.

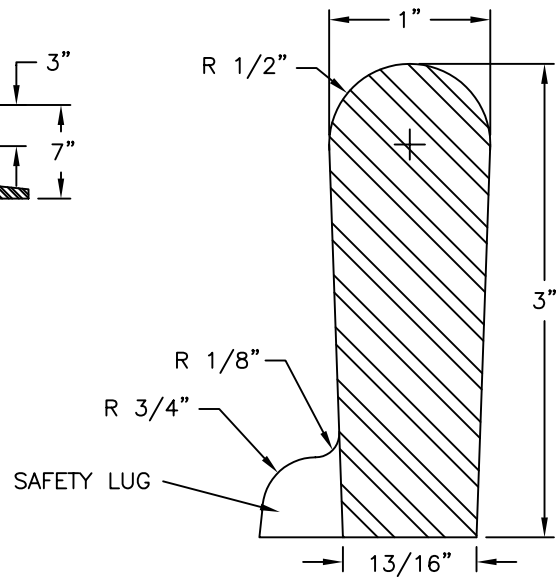
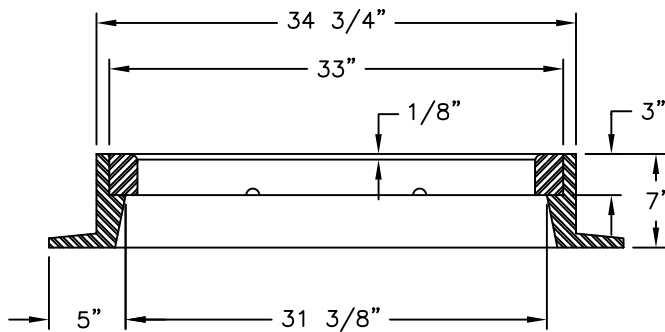
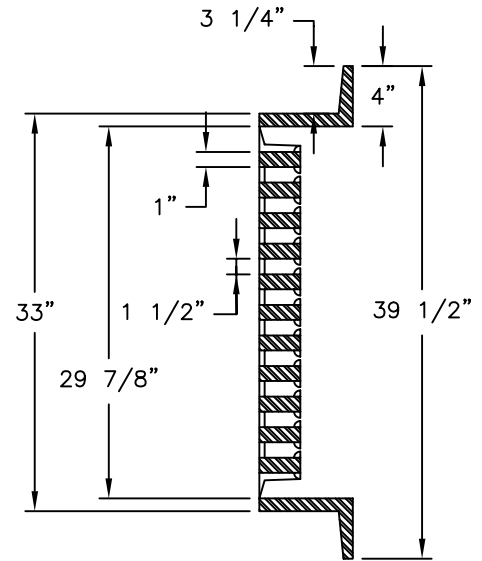
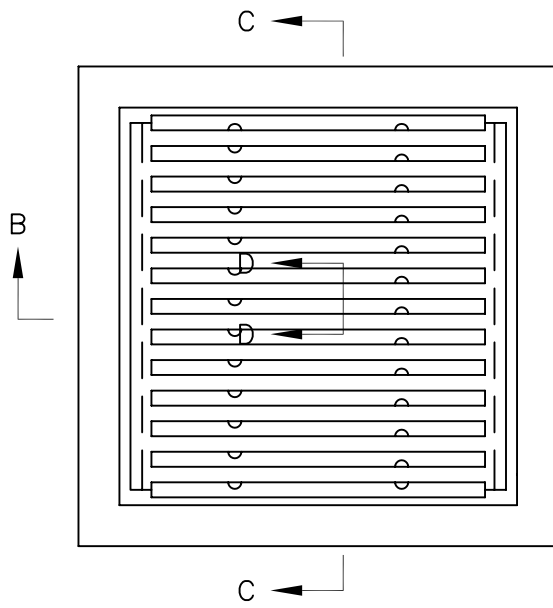
APPROVED DATE: June 20, 2003

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DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL

GRATE TYPE CATCH
BASIN WITH SAFETY GRATE

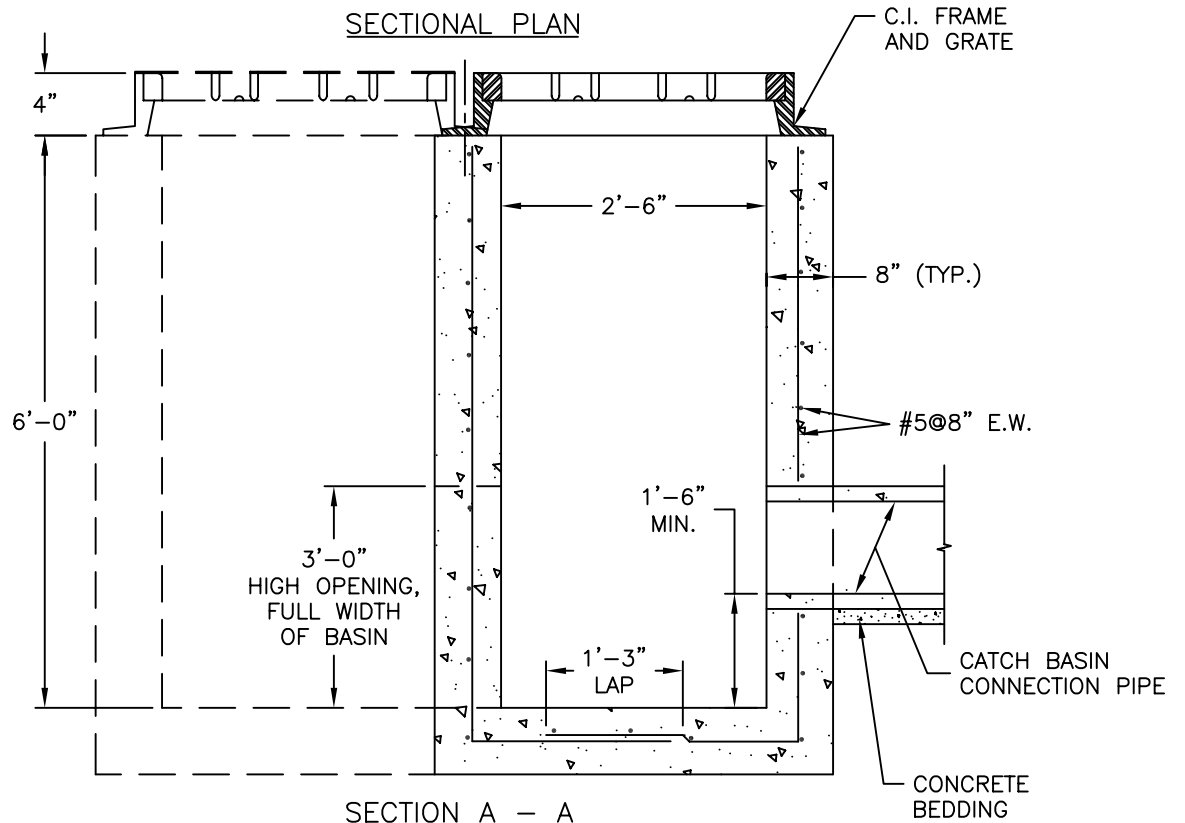
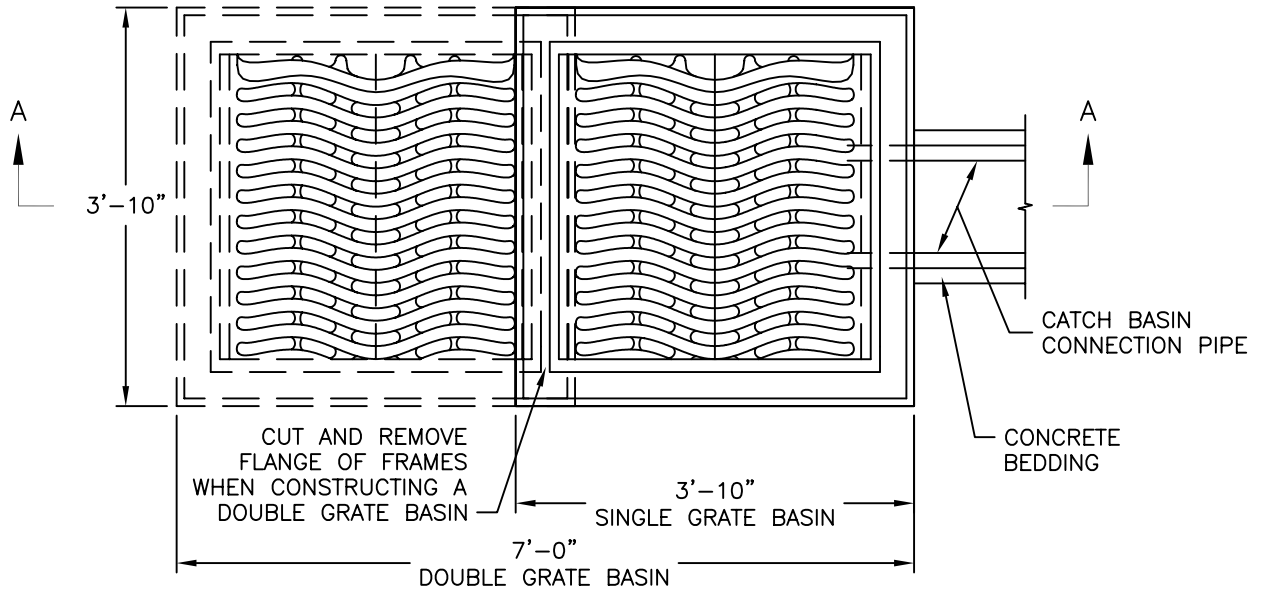


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REVISION NO.: 0
DATE: 6/20/03
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STANDARD DETAIL
GRATE TYPE CATCH
BASIN WITH SAFETY GRATE



NOTES:

1. GRAY IRON CASTINGS PER ASTM A-48, CLASS 30A.
2. ALL MACHINE FINISH TO BE A.S.A. SPECIFICATION, ROUGHNESS SYMBOL 250, TOLERANCE - 0 + 1/16".
3. ALL CONCRETE TO BE CLASS 4000, AIR ENTRAINED, TYPE II CEMENT.
4. REINFORCING SHALL BE CENTERED IN WALL AND BASE AND SHALL CONFORM TO ASTM A615 GRADE 60.

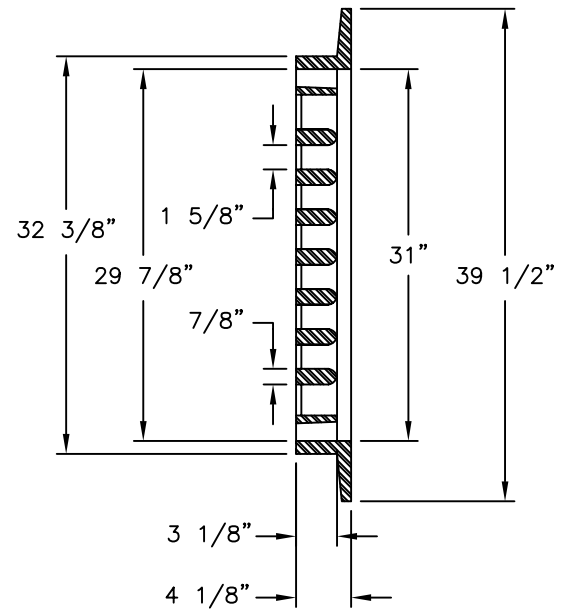
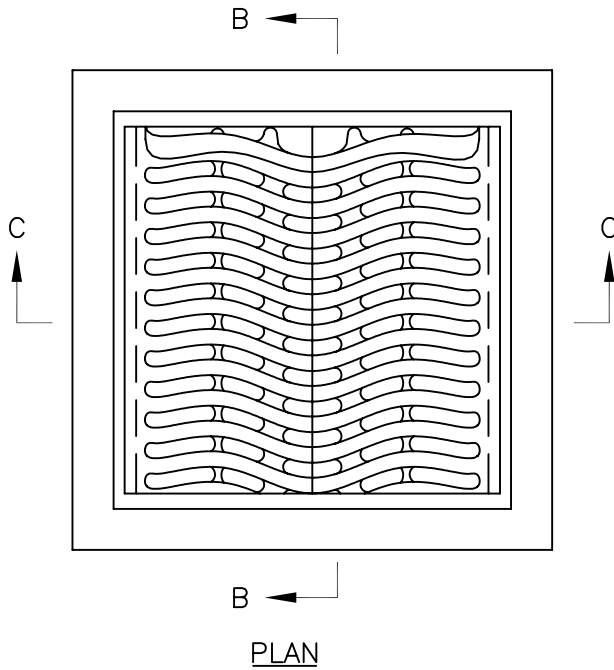
APPROVED DATE: June 20, 2003

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AND TECHNICAL SERVICES

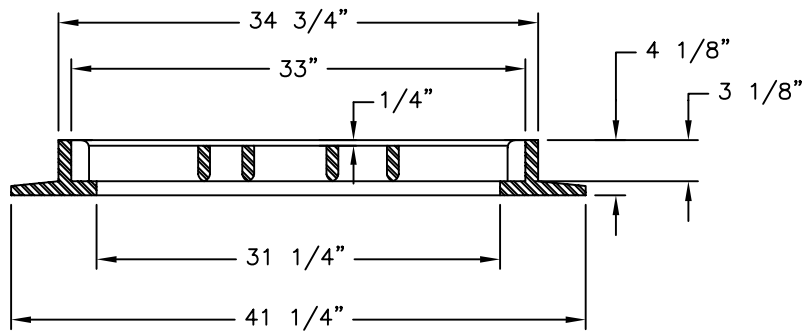
REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL

GRATE TYPE CATCH
BASIN WITH SERPENTINE GRATE



SECTION B-B



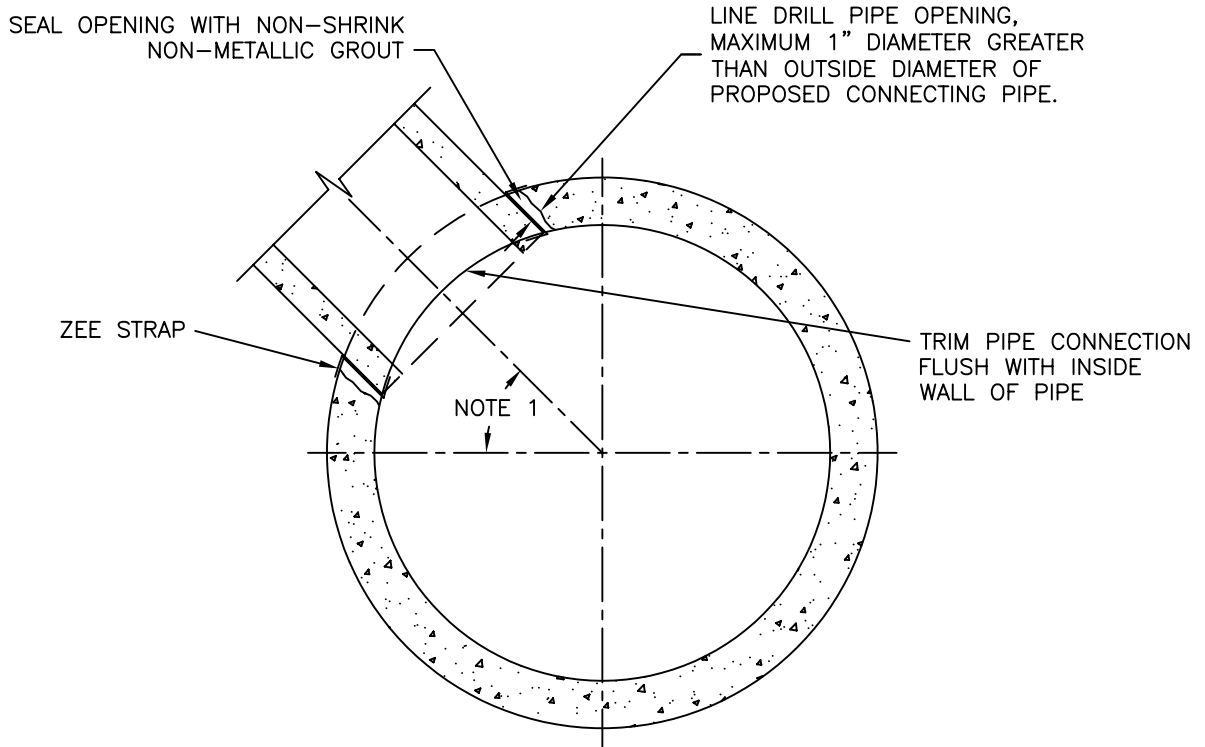
SECTION C-C

APPROVED DATE: June 20, 2003

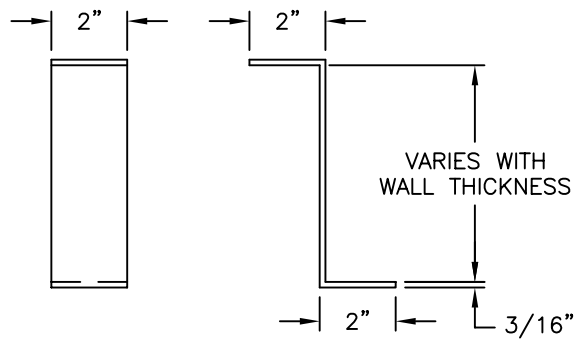
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DATE: 6/20/03
PREPARED BY: OBG/BKJV
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STANDARD DETAIL
GRATE TYPE CATCH
BASIN WITH SERPENTINE GRATE



SECTIONAL CONNECTION DETAIL



ZEE STRAP DETAIL

NOTE:

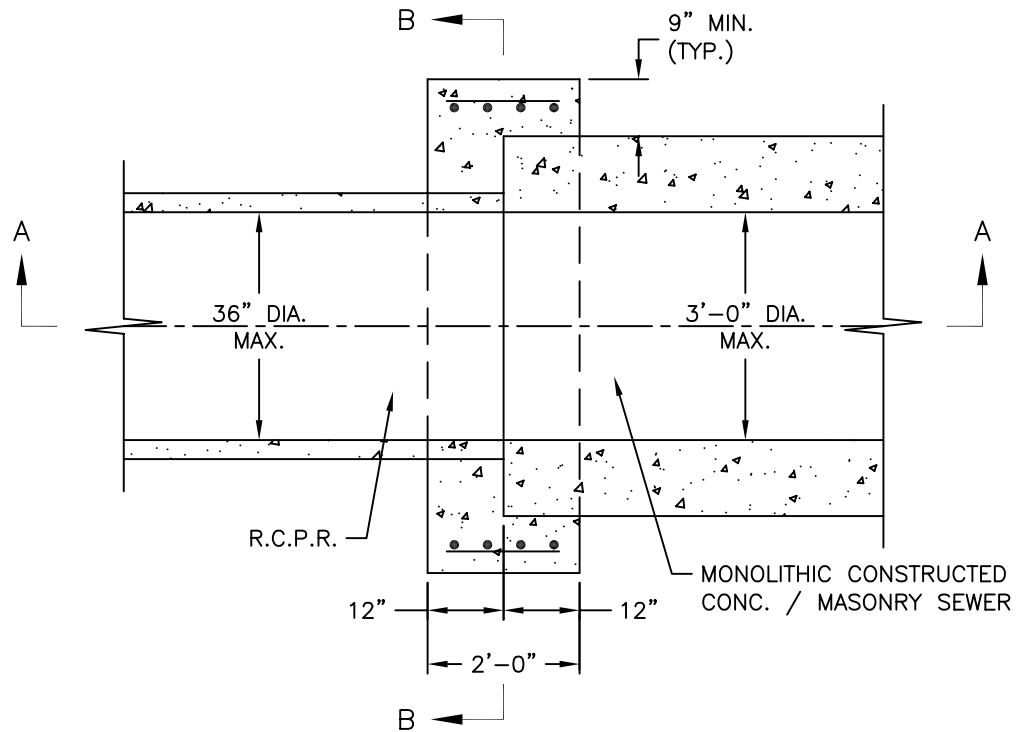
1. CONNECTIONS AT AN ANGLE GREATER THAN 45° FROM THE HORIZONTAL WILL ONLY BE PERMITTED WHEN SPECIFICALLY APPROVED BY WASA, AND MAY REQUIRE ADDITIONAL OR DIFFERENT PIPE RESTRAINT THAN ZEE STRAPS.

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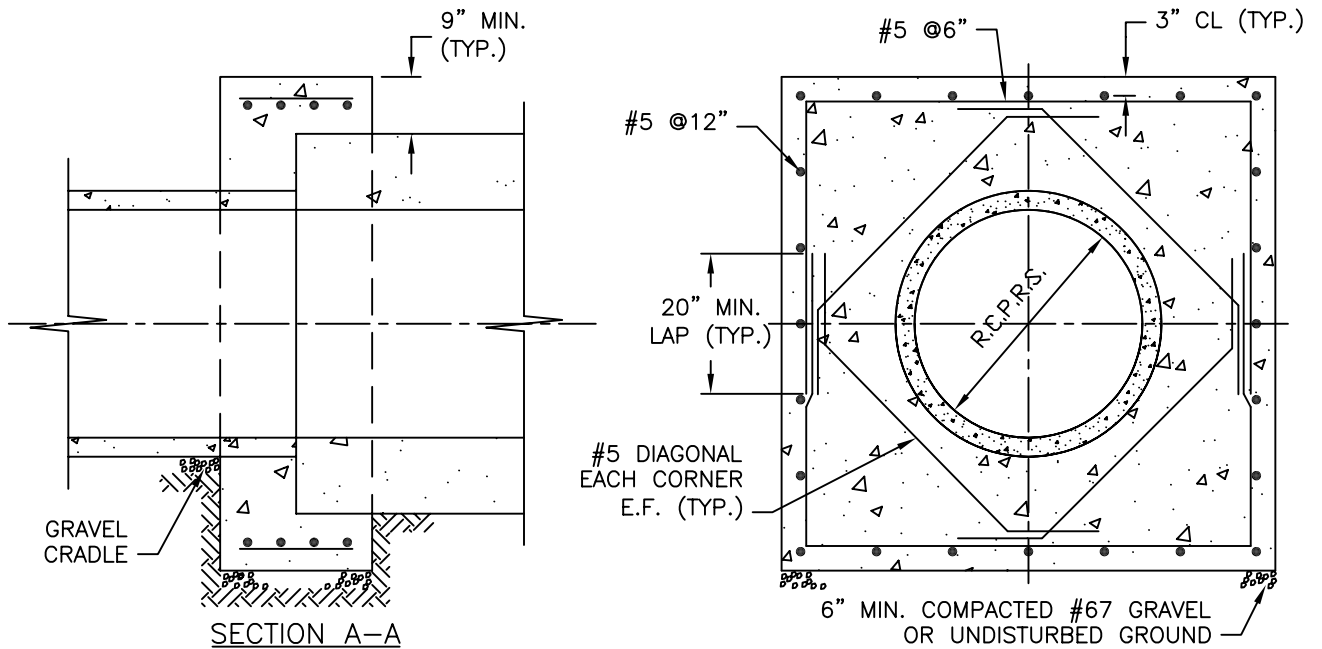
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REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL
CONNECTIONS TO SEWERS
LARGER THAN 36" I.D.
UTILIZING ZEE STRAPS



SECTIONAL CONNECTION DETAIL



SECTION A-A

SECTION B-B

NOTE:

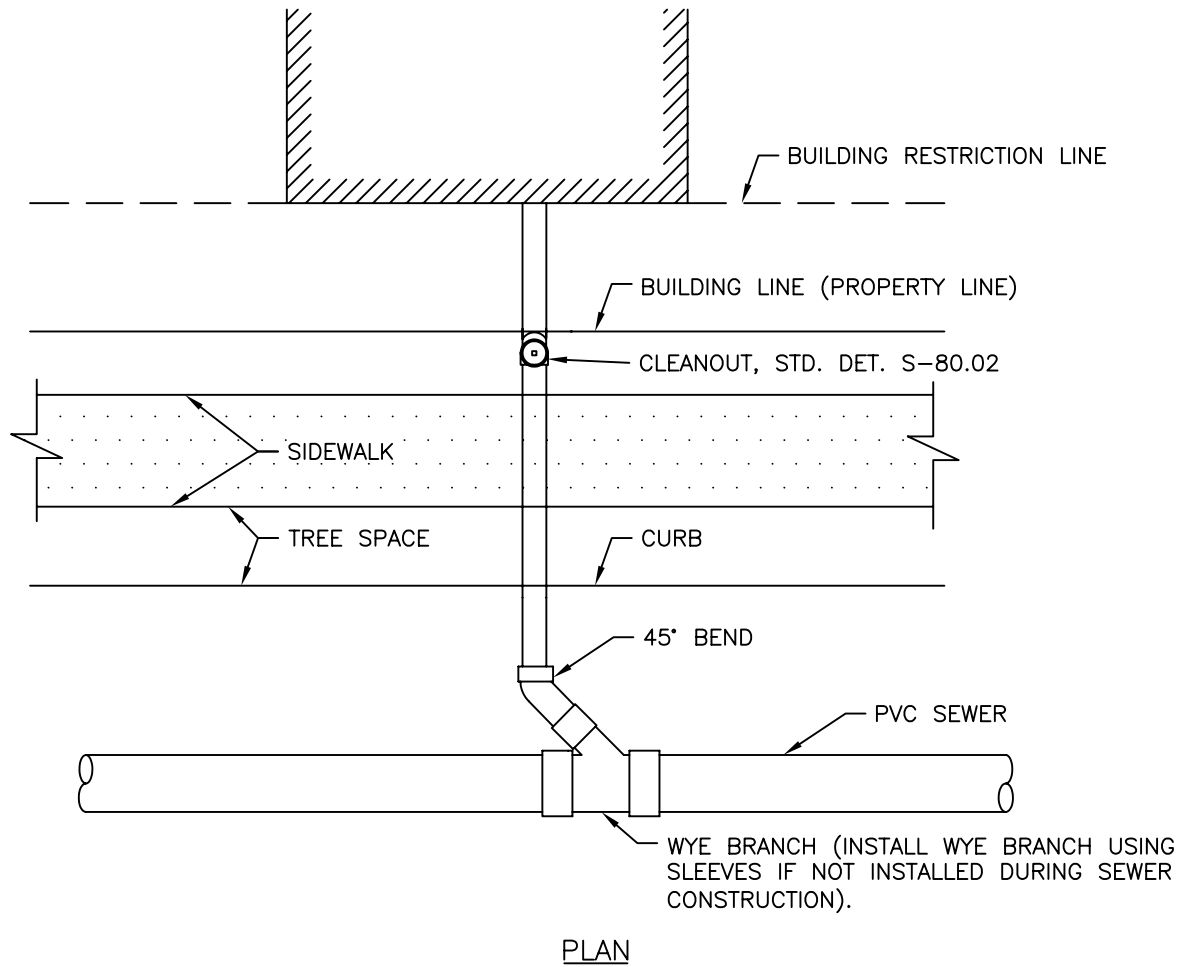
1. ALL CONCRETE TO BE CL. 4000, AIR ENTRAINED, TYPE II CEMENT
2. REINFORCING STEEL SHALL CONFORM TO ASTM A-615, GRADE 60.

APPROVED DATE: June 20, 2003

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DATE: 6/20/03
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STANDARD DETAIL
REINFORCED CONCRETE PIPE COLLAR
DETAIL - 36" AND SMALLER DIA.



NOTES:

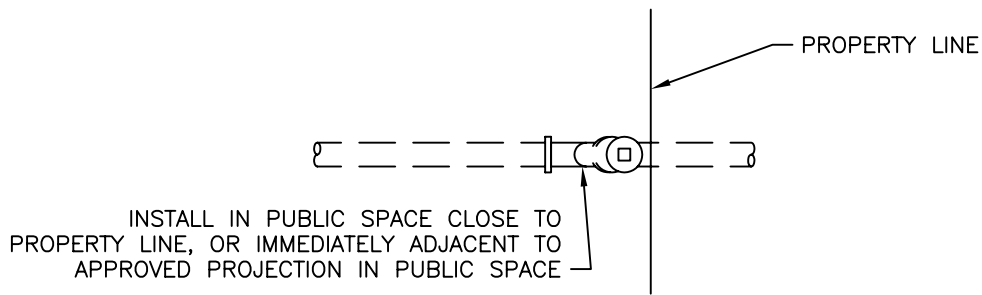
1. MATERIALS AND WORKMANSHIP BETWEEN THE WYE BRANCH AND THE BUILDING MUST BE IN ACCORDANCE WITH D.C. PLUMBING CODE.
2. VERTICAL BENDS FOR GRADE (NOT SHOWN) MAY BE REQUIRED ON SEWER LATERAL.

APPROVED DATE: June 20, 2003

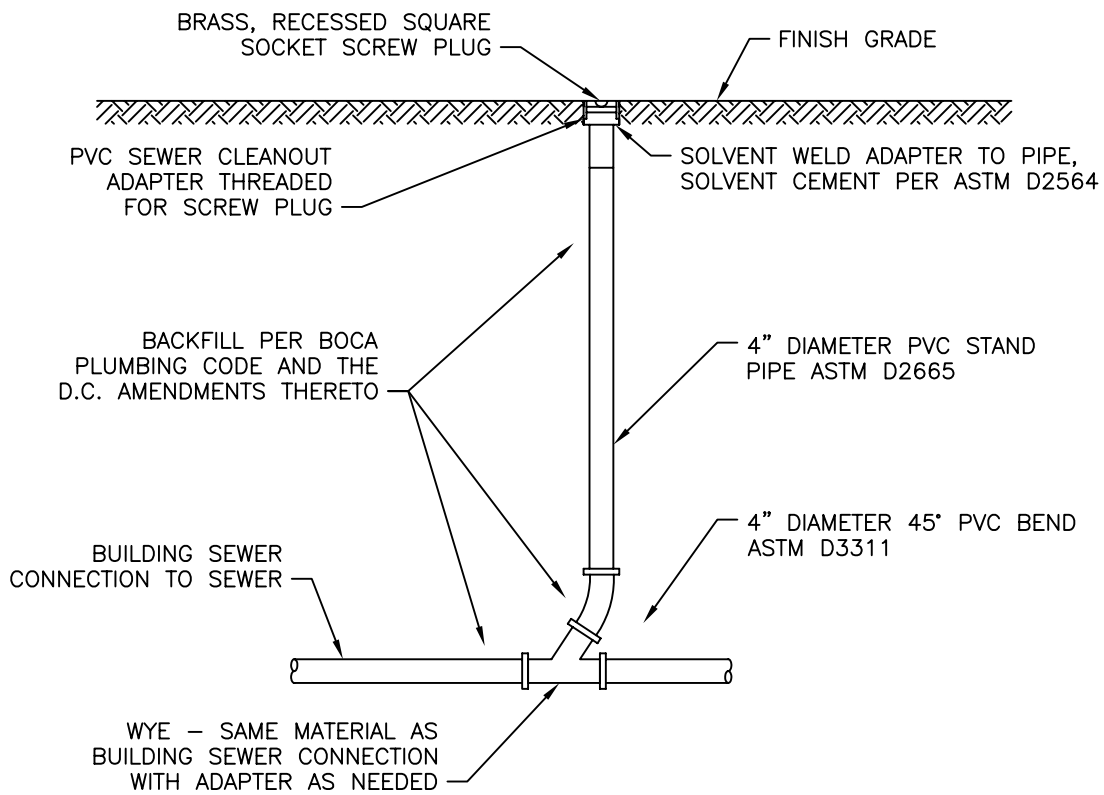
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REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL
SEWER LATERAL PLAN
(CONNECTION TO PVC SEWER)



PLAN



ELEVATION

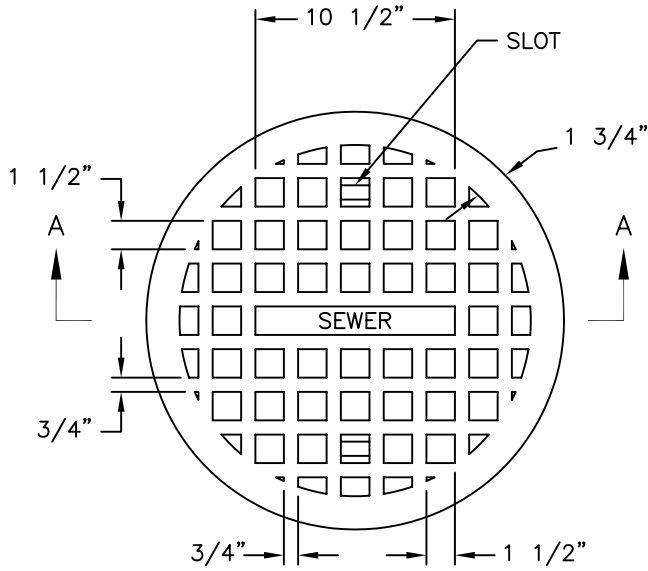
APPROVED DATE: June 20, 2003

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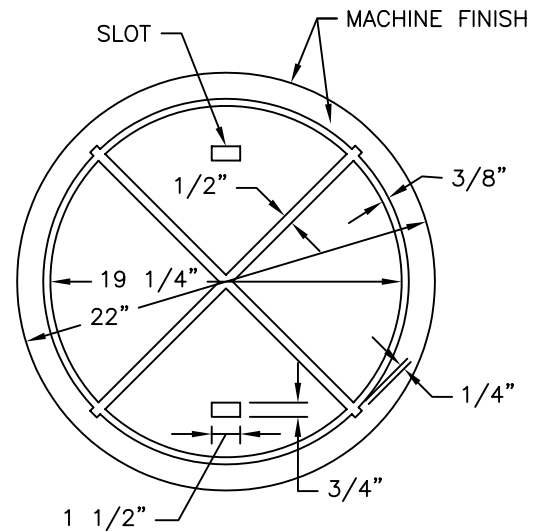
REVISION NO.: 0
 DATE: 6/20/03
 PREPARED BY: OBG/BKJV
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STANDARD DETAIL

BUILDING SEWER COLLECTION CLEANOUT



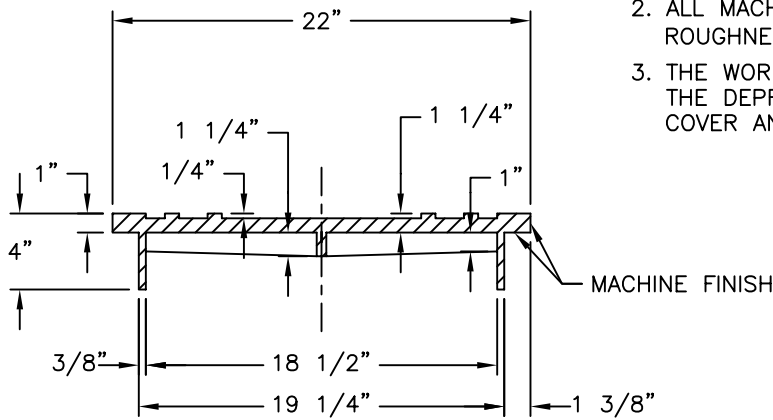
PLAN - COVER



PLAN - COVER BOTTOM

NOTES:

1. GRAY IRON CASTINGS PER ASTM A-48, CLASS 30A.
2. ALL MACHINE FINISH TO BE A.S.A. SPECIFICATION, ROUGHNESS SYMBOL 250, TOLERANCE $-0'' +1/16''$.
3. THE WORD "SEWER" IN 1" LETTER SHALL BE CAST IN THE DEPRESSION SHOWN IN THE CENTER OF TOP OF COVER AND TO BE FLUSH WITH SURFACE OF COVER.



SECTION A-A

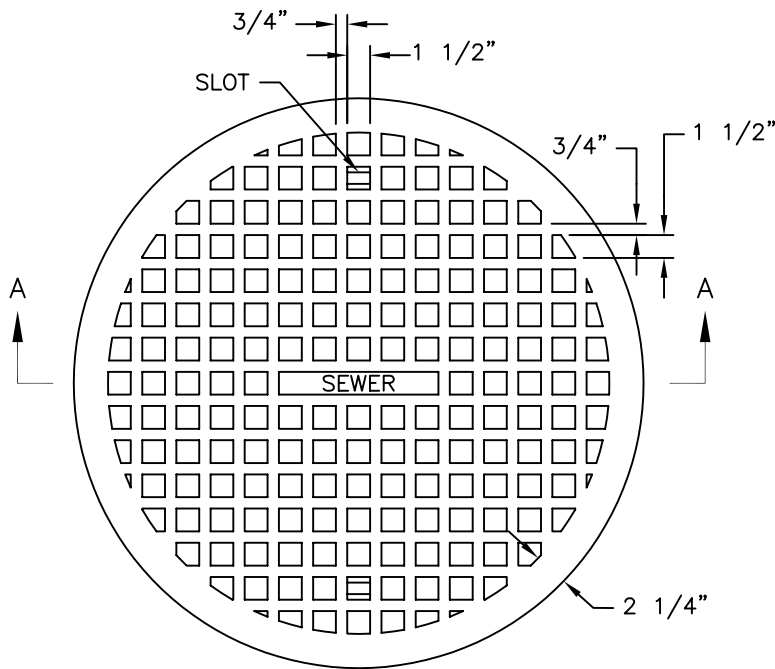
APPROVED DATE: June 20, 2003

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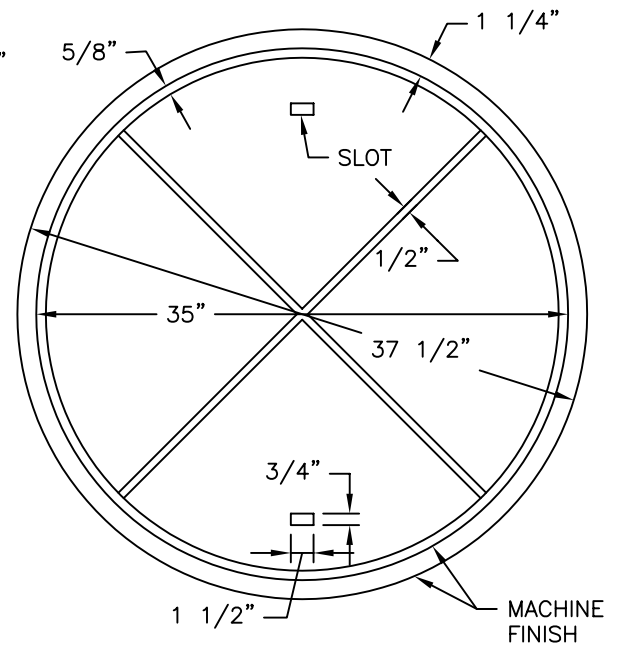
REVISION NO.: 0
 DATE: 6/20/03
 PREPARED BY: OBG/BKJV
 CHECKED BY: W.DARROW

STANDARD DETAIL

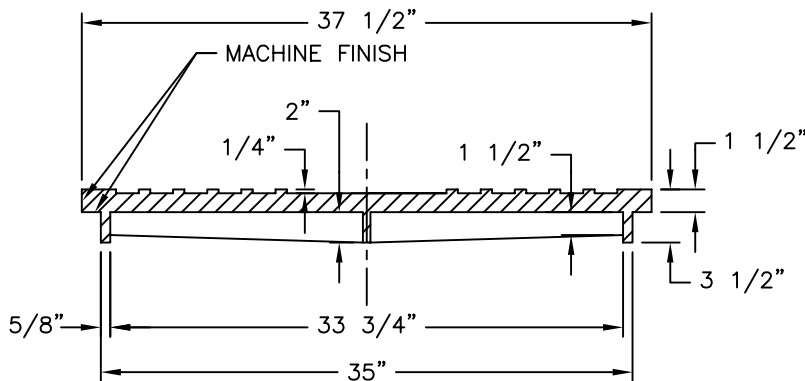
DETAILS OF 24" CAST
 IRON MANHOLE COVER



PLAN - COVER



OVER BOTTOM VIEW



SECTION A-A

NOTES:

1. GRAY IRON CASTINGS PER ASTM A 48, CLASS 30A.
2. ALL MACHINE FINISH TO BE A.S.A. SPECIFICATION, ROUGHNESS SYMBOL 250, TOLERANCE $-0" +1/16"$.
3. THE WORD "SEWER" IN 1" LETTER SHALL BE CAST IN THE DEPRESSION SHOWN IN THE CENTER OF TOP OF COVER AND TO BE FLUSH WITH SURFACE OF COVER.

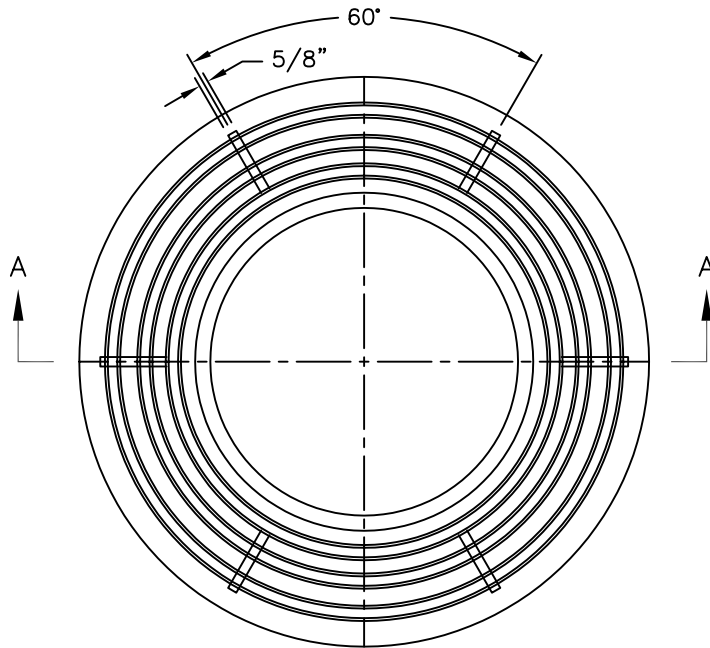
APPROVED DATE: June 20, 2003

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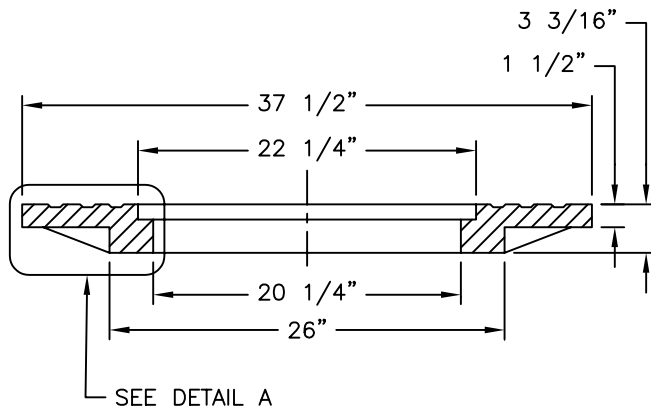
REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL

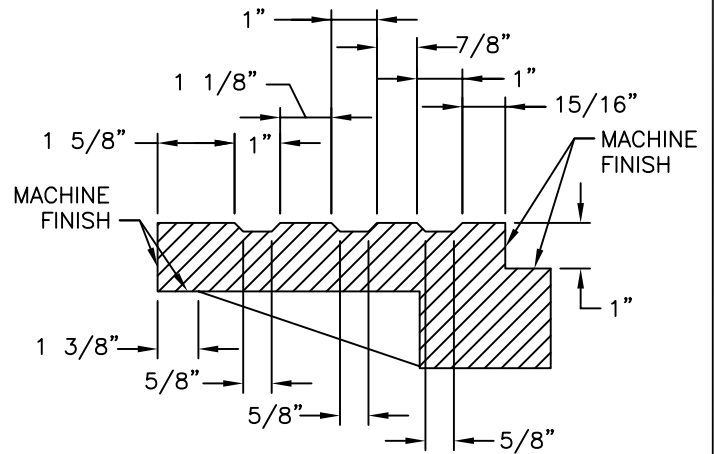
DETAILS OF 36" CAST IRON MANHOLE COVER



PLAN - ADAPTER RING



SECTION A-A



DETAIL A

NOTE:

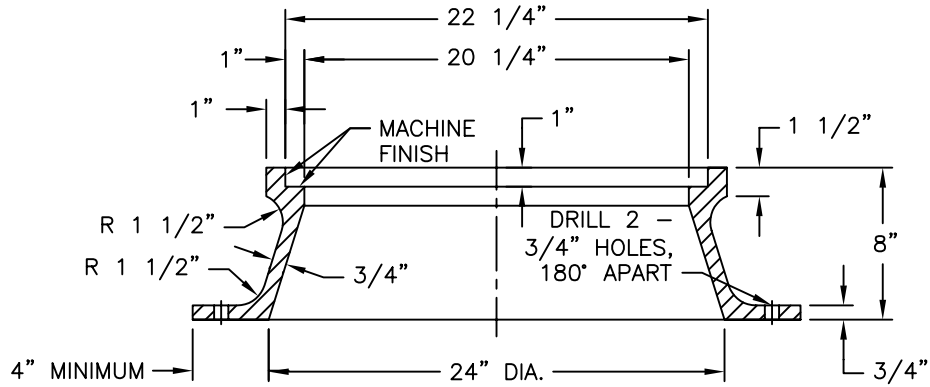
1. GRAY IRON CASTINGS PER ASTM A48, CLASS 30A.
2. ALL MACHINE FINISH TO BE A.S.A. SPECIFICATION, ROUGHNESS SYMBOL 250, TOLERANCE -0" +1/16".

APPROVED DATE: June 20, 2003

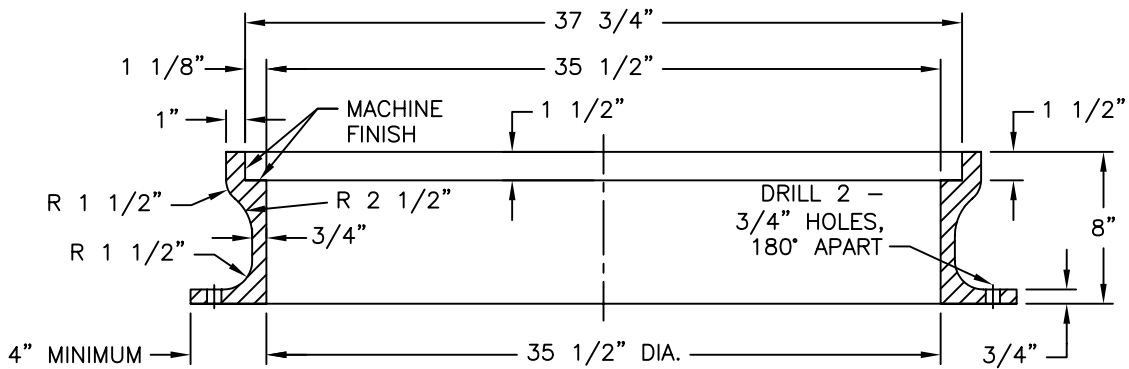
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REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL
MANHOLE ADAPTER RING 36" DIA. TO 24" DIA.
FOR USE ON SEWERS 15' OR LESS
IN DEPTH REQUIRING 36" DIAMETER FRAME



SECTION OF 24-INCH DIAMETER FRAME



SECTION OF 36-INCH DIAMETER FRAME

NOTE:

1. GRAY IRON CASTINGS PER ASTM A 48, CLASS 30A.
2. ALL MACHINE FINISH TO BE A.S.A. SPECIFICATION, ROUGHNESS SYMBOL 250, TOLERANCE $-0'' +1/16''$.

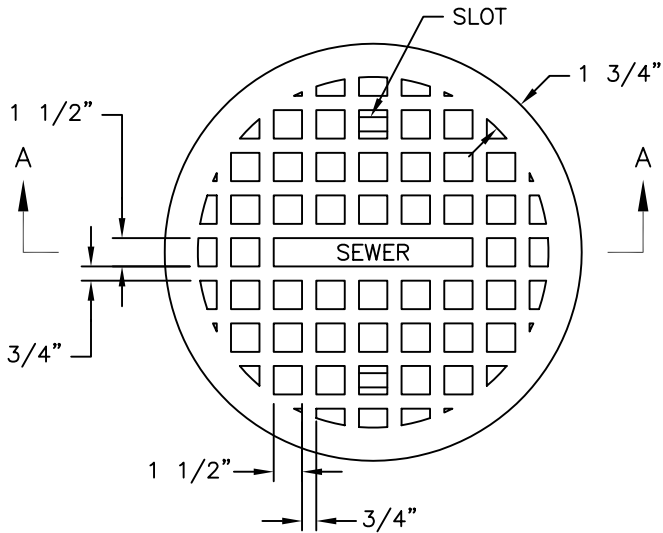
APPROVED DATE: June 20, 2003

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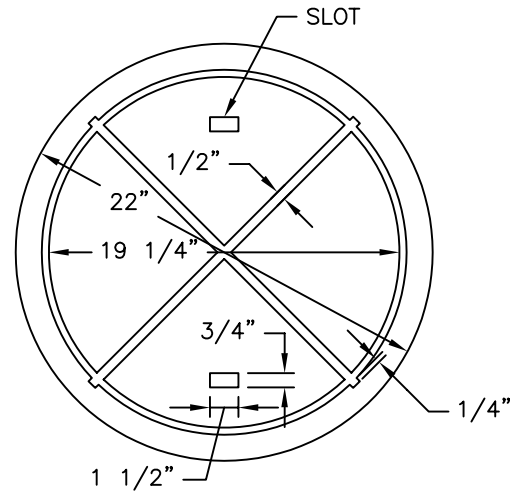
REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL

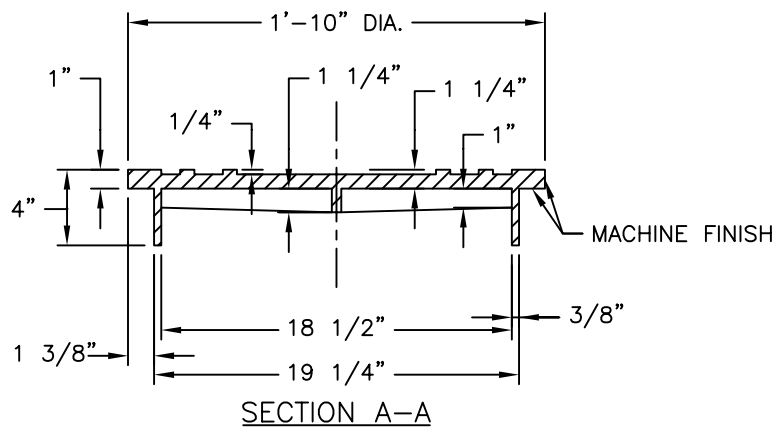
DETAILS OF 24" & 36" DIAMETER
CAST IRON FRAMES



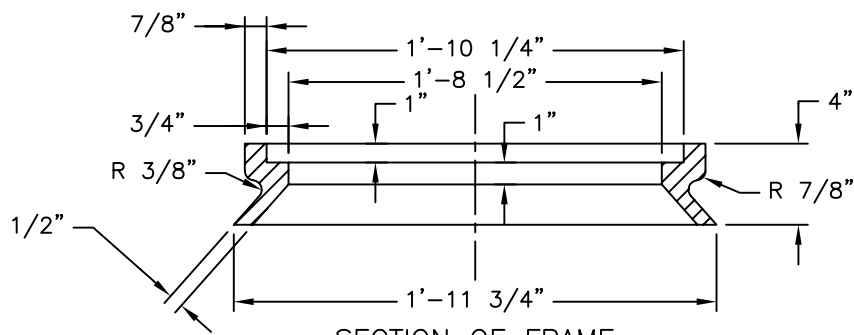
PLAN - COVER



PLAN - COVER BOTTOM



SECTION A-A



SECTION OF FRAME

NOTES:

1. GRAY IRON CASTINGS PER ASTM A-48, CLASS 30A, OR 35.
2. ALL MACHINE FINISH TO BE A.S.A. SPECIFICATION, ROUGHNESS SYMBOL 250, TOLERANCE -0" +1/16".
3. THE WORD "SEWER" IN 1" LETTERS SHALL BE CAST IN THE DEPRESSION SHOWN IN THE CENTER OF TOP OF COVER AND TO BE FLUSH WITH SURFACE OF COVER.

APPROVED DATE: June 20, 2003

DIRECTOR, DEPARTMENT OF ENGINEERING
AND TECHNICAL SERVICES

REVISION NO.: 0
DATE: 6/20/03
PREPARED BY: OBG/BKJV
CHECKED BY: W.DARROW

STANDARD DETAIL
DETAILS OF 24" CAST IRON
COVER AND FRAME FOR
BASIN TOP



DC Water Catch Basin Application

User Manual

Version 2.0

March 2020

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1. Introduction

The DC Water Mobile Application is a custom .NET application created by DC Water IT to combine access to work and asset management functions with GIS mapping functions. Providing a map-centric view of the work assigned to a crew, this application was originally designed to support and track the daily operations of catch basin cleaning.

The application uses the ArcGIS Runtime SDK for .NET components as the mapping engine and provides offline capability by caching and synchronizing work, asset and mapping data locally on the device.

This Catch Basin Application (hereon referred as 'CB App') User Manual describes the usage of the new CB App version which has been rolled out as of February 2020.

The new CB App version carries the same functionality as the previous CB App.

This manual is targeted to both current users of previous CB App and also new users who will be using the new CB app.

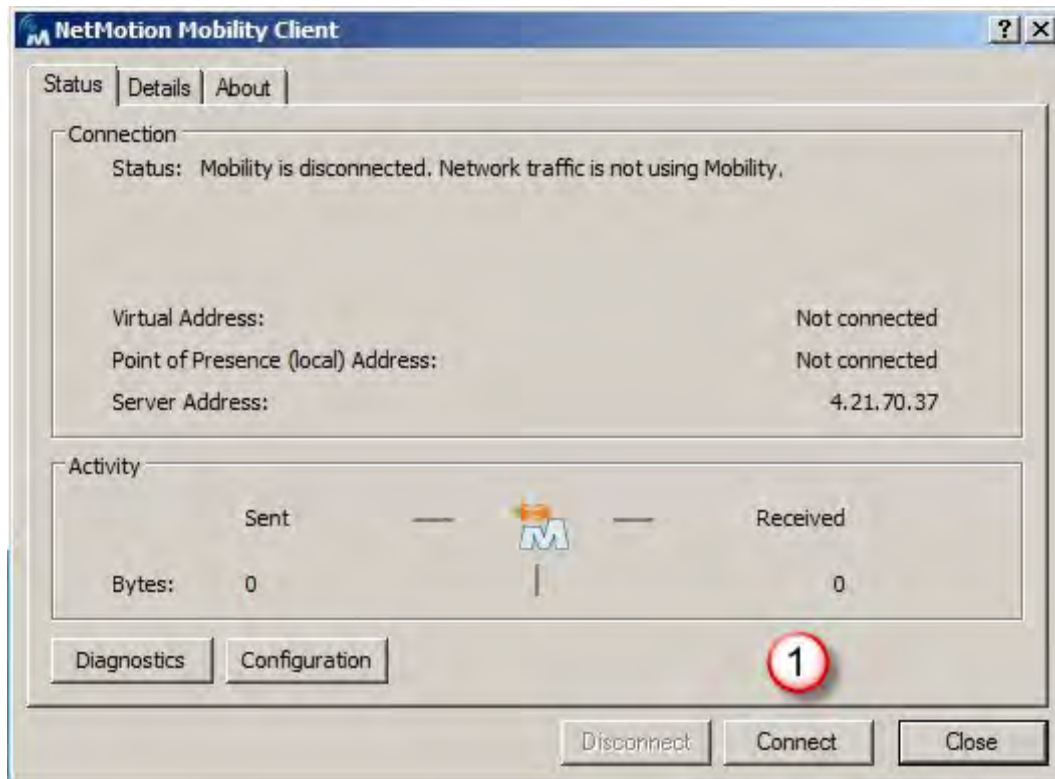
2. Use Case: Start of Day

At the start of the day, the crew must:

- Power up the laptop;
- Login to Windows using their DCWASA network ID;
- Connect to Net Mobility using their RSA username and token. Double click the Mobility Client Icon



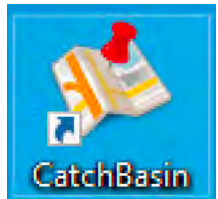
Then Click Connect (1)



Next enter their windows ID (1) and RSA Token (2) and click Ok (3)



Start the application. Double click on the application Icon



As the application launches, it will display a splash screen,



and afterwards the login screen will appear.

Logging into the CB Application

The user enters their **Maximo Credentials** (username/password) (1) and (2). The user must select (3) either the CB App mode of operation which can be either PM or INSP. Where PM is preventive maintenance application mode, and INSP is inspector application mode. By default, the selection is PM (preventive maintenance) application mode.

In order to enter the CB App the user clicks the Login (4) button.



The screenshot shows the login interface for the DC Water Mobile Catch Basin Application. At the top, the DC Water logo is displayed with the tagline "water is life". Below the logo, there are four numbered callouts: (1) Username input field, (2) Password input field, (3) Radio buttons for "PM" (selected) and "INSP", and (4) Login button.

Figure 1 - Login screen

Pre-requisites for login:

- You must be assigned a login name/password by DC Water
- Your login name must be assigned a proper Labor Craft Rate
- Your login name must be assigned to a Crew
- Your login name must be assigned either as a PM (Preventive Maintenance) or INSP (Inspector) in order to be using the proper CB App functionality

If all of the above pre-requisite conditions are met, you will be able to login to the CB App.

Off-line and On-line Usage of CB App

The CB App is able to work both off-line and on-line. This means it can work either if you have a network (Internet) connection or not.

Note: *If the user login in is the same as the last person who logged in and the credentials are valid, the application will allow the user in and allow him to access the work orders if there is no network access.*

Pre-requisite: If you are using the CB App for the first time, you must have an active network (Internet) connection just for the first connection. When your login credentials are authenticated online after first login, they will be stored in the GETAC for future off-line accessibility.

After the first login, which must be online, subsequent logins can be either online or offline.

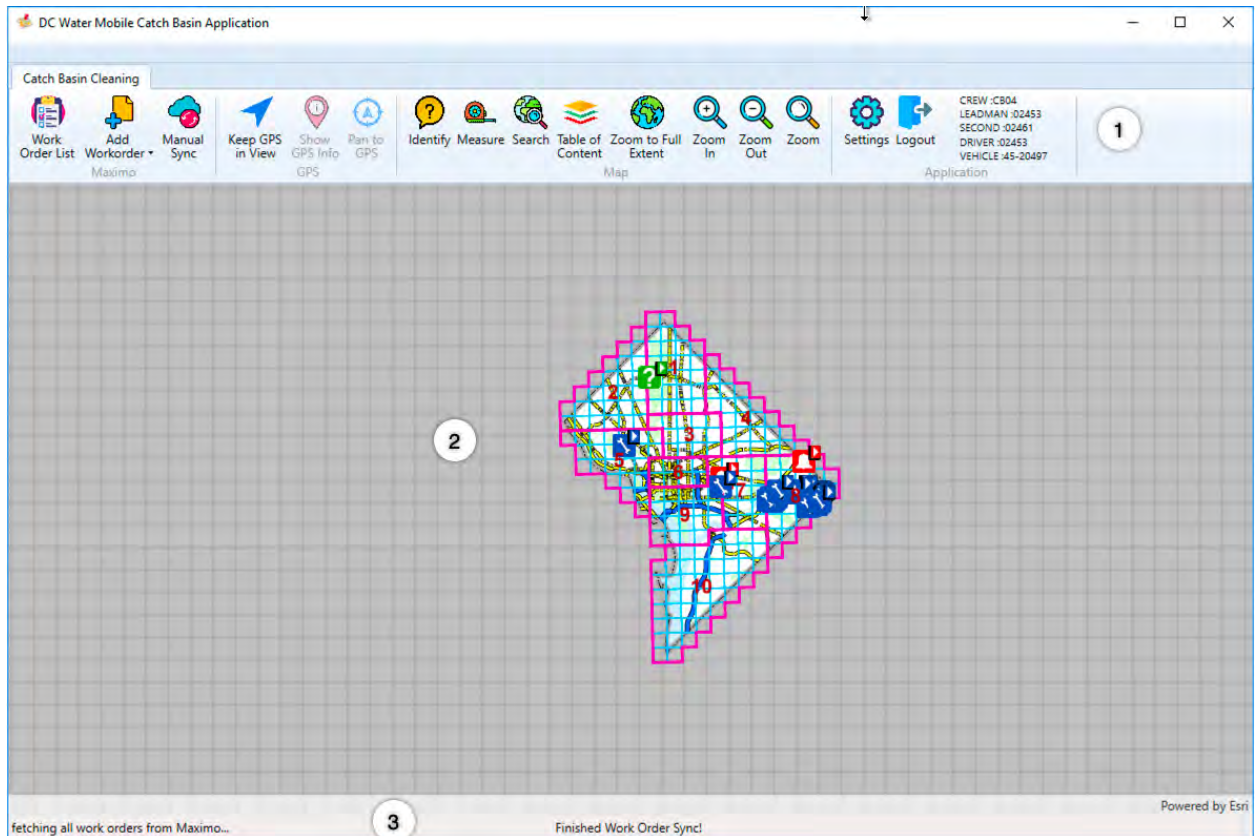
If any of the pre-requisite conditions are not met, you will be able to login to the CB App.

Please refer to [APPENDIX – 1: Exceptional Cases Causing Error During Login](#) for exceptional cases during login.

Catch Basin Application Main Application Screen

After you login successfully into the system (either offline or online) you will see the screen as shown below. The main window is divided in 3 areas as shown below, the header region (ribbon bar) (1), the content frame (2) which will usually show the map and a footer status bar region (3).

The functionality of the Ribbon Bar (1) is explained in detail in **APPENDIX – 2: The CB App Menu Bar** (top ribbon bar).



The CB App Synchronization Status Bar (bottom status bar):

If you are online, the CB App will try to fetch all new work orders assigned to your crew or crew CB00 from Maximo. The CB App will also update any data entries, which were entered in off-line mode, to Maximo.

Crew members must make sure that before they dispatch to execute work orders, they must fully synchronize their GETAC machines, so that all work orders are properly loaded for their daily work.

Simultaneously (if you are online), the GIS data will also be updated.

The progress of synchronization of work orders and GIS map layers can be observed on the bottom bar (3) of the CB App. On the left bottom bar, the work order synchronization progress can be observed, and in the middle of the bar the status of the GIS map layers data update can be observed.

Once the synchronization process is complete. The status bar will indicate Maximo synchronization complete or Download Complete (for GIS) as shown in Figure 2.

The synchronization process will be repeated at regular intervals as determined by the CB App Administrator in DC Water.

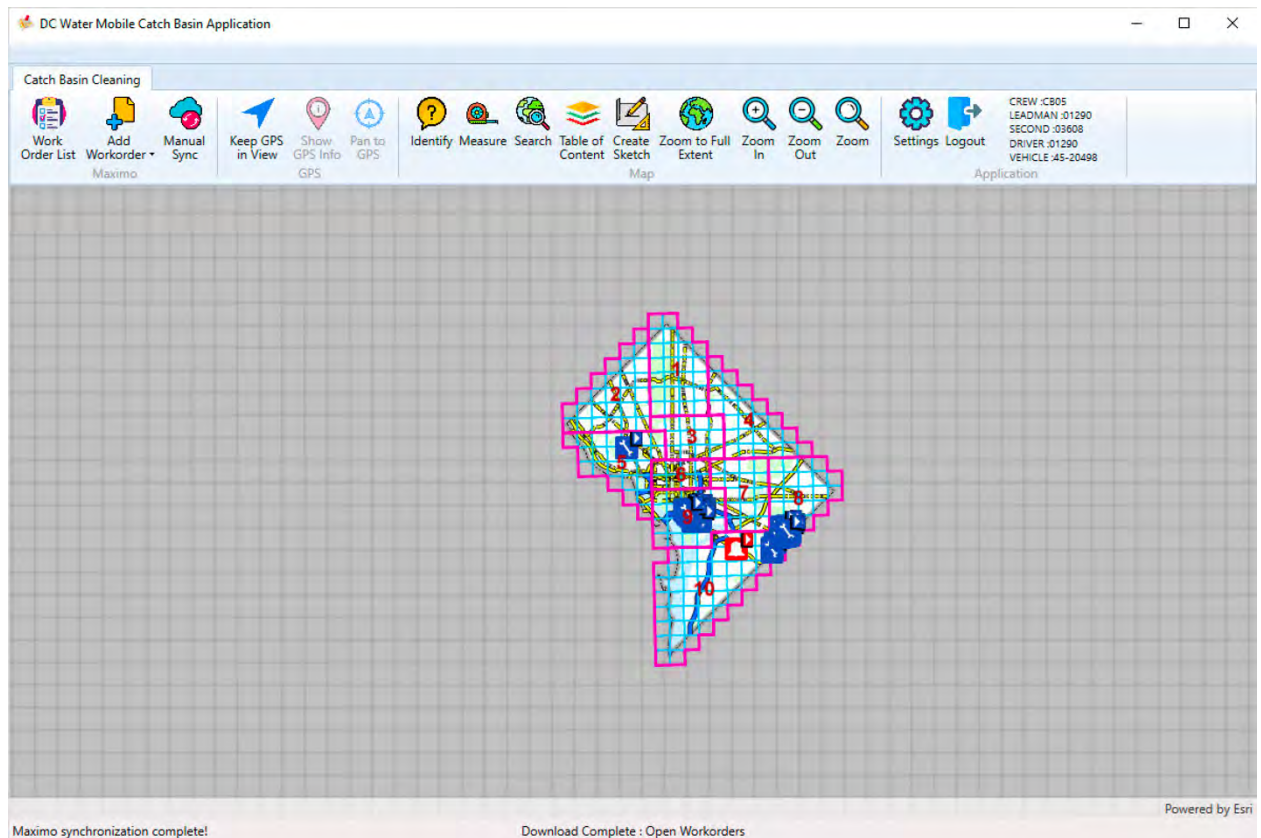


Figure 2 - Application main screen for PM mode CB App, showing in status bar synchronization complete

Work Order List

The user then can display his/her assigned work by pressing the **Word Order List** button (shown in Figure 3) on the main application screen ribbon bar (1).

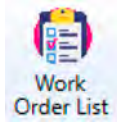
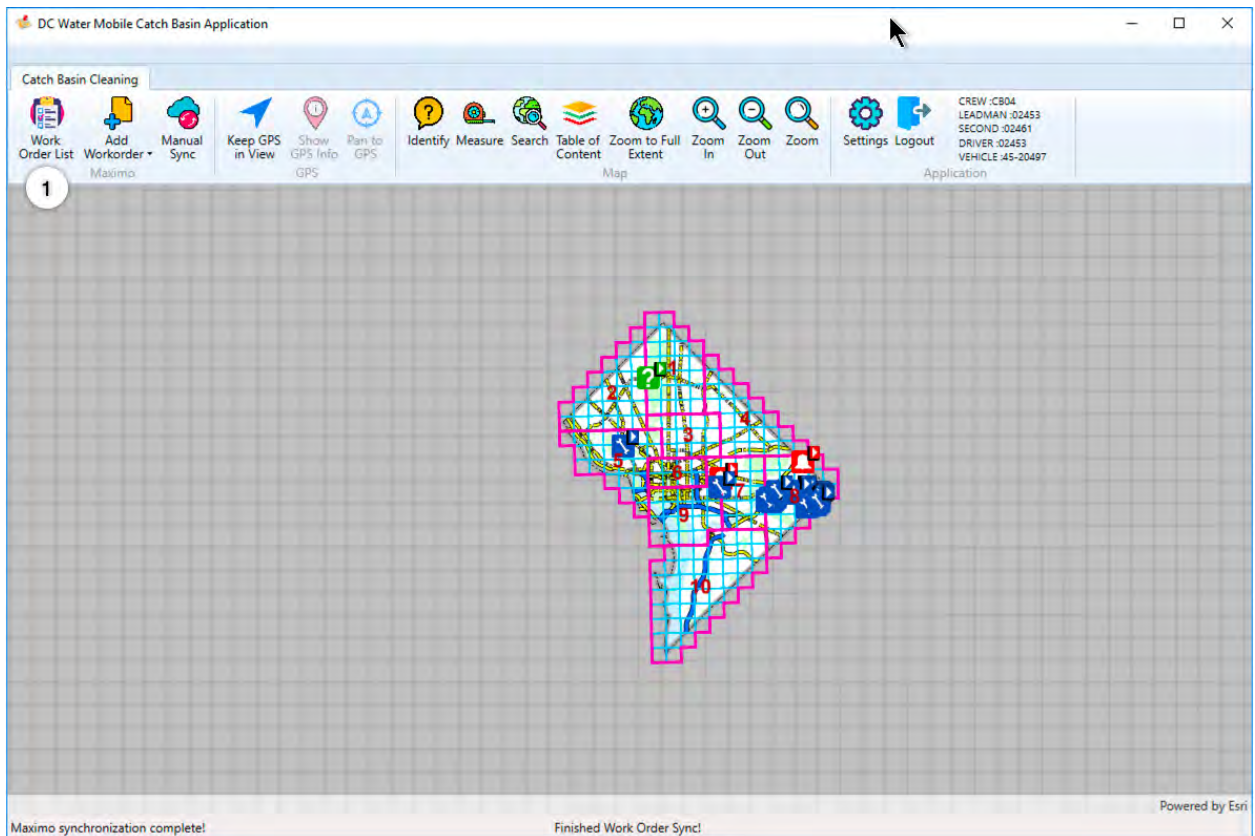


Figure 3 – Work Order List button



The application will then display the work orders both in a list view (1) on the left, and on the map (2) which the user is currently assigned to and also the WOs assigned to Crew: CB00. The total number of work orders is shown on the top right of the list (3).

Note that EMERG (Red colored) and INV (Green colored) work orders will be sorted first in the list (1), followed by regular PM work orders. Please see Figure 4 for the list of work orders displayed on the left of the PM App screen.

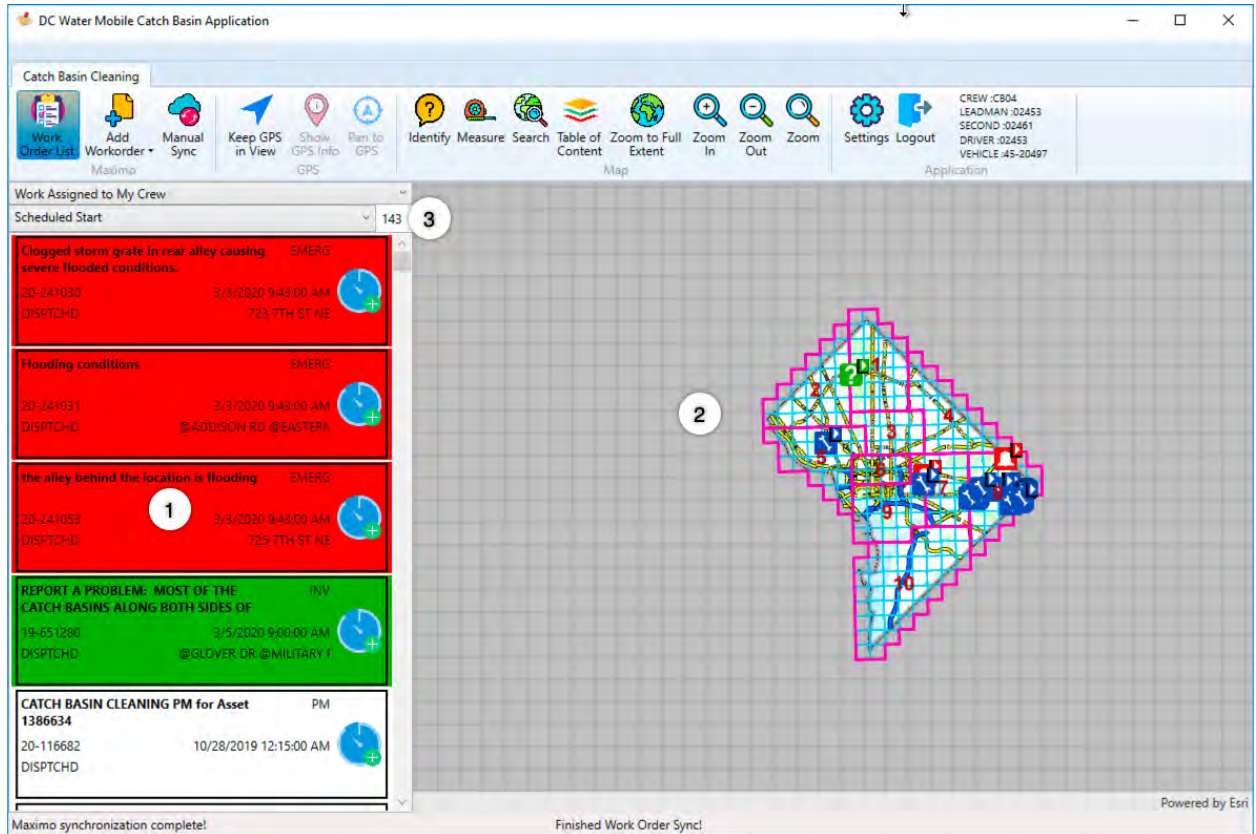
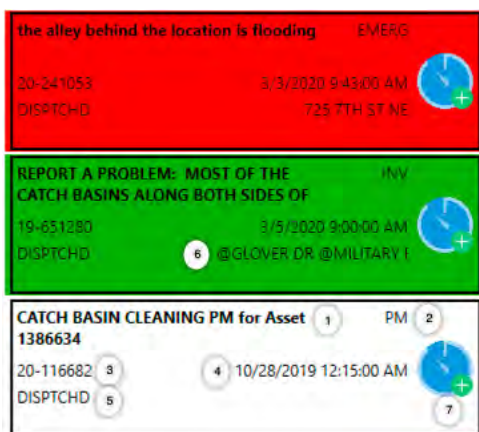


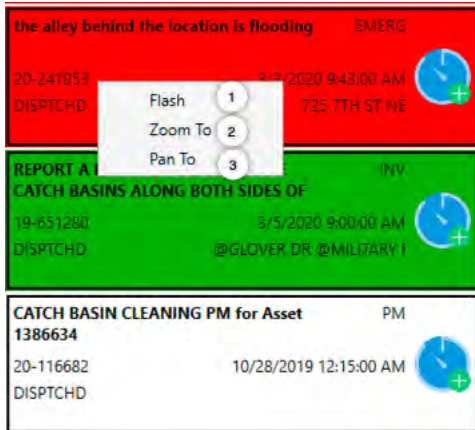
Figure 4 – Work Order List display with EMERG WOs displayed in prior order

Each list item shows key attributes of the work order as shown below. The work order description field (1), work type (2), work order number (3), scheduled date (4), work order status (5), asset tag or location (6). It also has a start/stop button for the work timer (7). If the user presses any work order the details of work order will be shown on the right.



Investigation work (green color) and Emergency work (red color) will be displayed in the list with a different background color to make them stand out. Placing the cursor over fields that have content that exceeds the available space will reveal that content in the tool tip

Right clicking on a work order entry in the list will reveal a popup window allowing the user to navigate the map to that work order either by simply highlighting it temporarily (1), zooming to in (2) or panning to it(3).

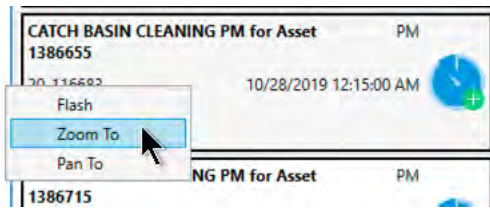


Warning Once a work order is being edited (including starting the timer), many functions will be disabled until the work order record is saved or the changes cancelled.

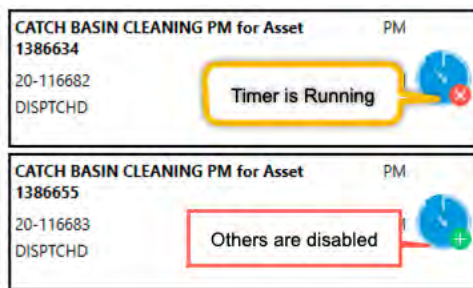
3. Use Case: Normal Catch Basin Cleaning

In normal condition, the Catch Basin Foreman will have assigned a number of cleaning work orders for each crew to clean that day. The process to record that a catch basin has been cleaned is pretty straight forward.

The first step is to locate the catch basins that need to be cleaned. One can do that by selecting one from the list and zooming to it or by navigating on the map and selecting it by clicking on it.



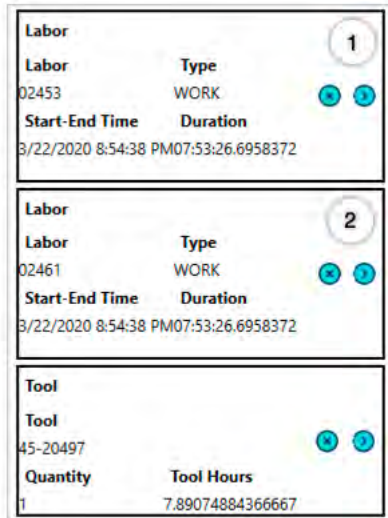
If there is travel required to get to that location, the crew should start the timer on that work order to keep track of the travel time.



Once at the work site, the crew stops the timer and the Actuals window pops up.

REMINDER: Do not forget to Start the timer and record **travel time** for the specific work order. Also, if required do not forget to Start the timer and record **labor time** for the specic work order if labor is required.

Unless, there are any timer records the user will not be able to Complete the specific work order (the Complete button will only be enabled if there are timer records).



The user must then change the type of labor record from Work to Travel (refer to APPENDIX-4: Editing Actuals) for each member by clicking the caret on the right (1 and 2). Once that is done, the user should click on Pause Work to save this information in the work order. The user can then proceed on starting the timer again as he starts cleaning the catch basin.

As the timer is running, the user should then perform the work and when he's done he should click on the edit caret to display the attributes of that work order. On the work order attributes are displayed as shown below, the first thing the user should do is to confirm/update the asset attributes by clicking the edit caret on the asset attribute (1) (refer to APPENDIX-8: Editing Asset Attributes). Once he's done confirming/editing the asset attribute, the user should then proceed in filling out the remaining attributes specific for this work order type (2, 6, 7) and the failure hierarchy (3,4,5). The user should ignore the Status attribute and the Actuals attribute at this time since these will be handled later by stopping the timer.

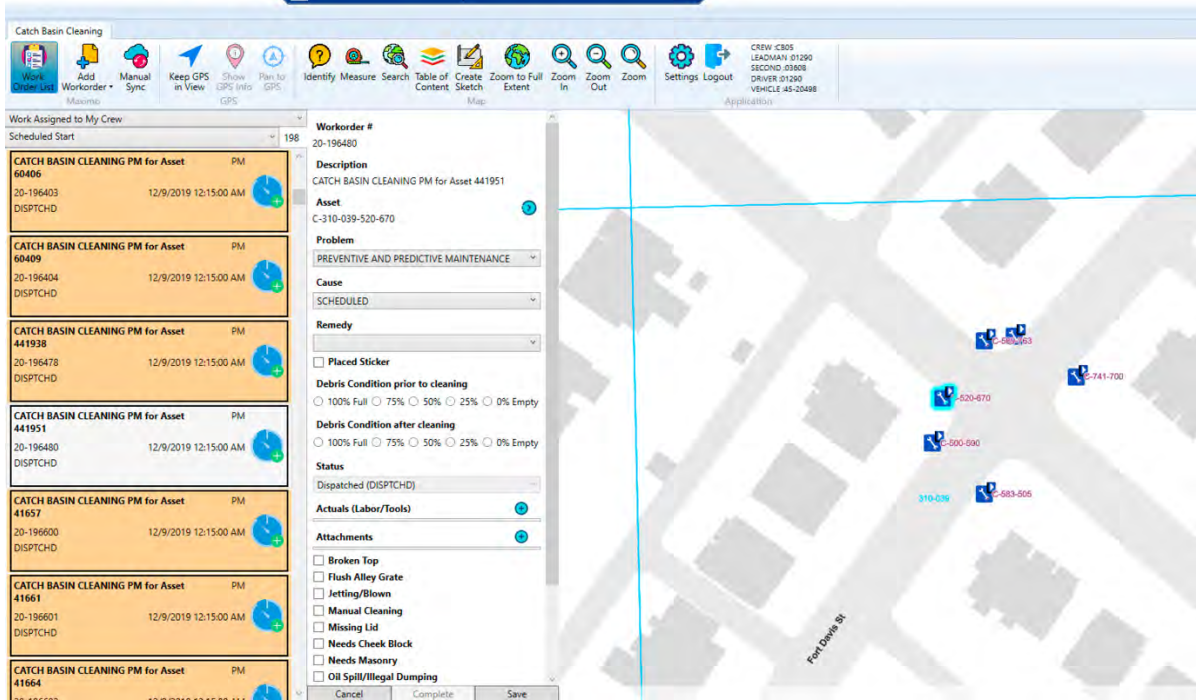
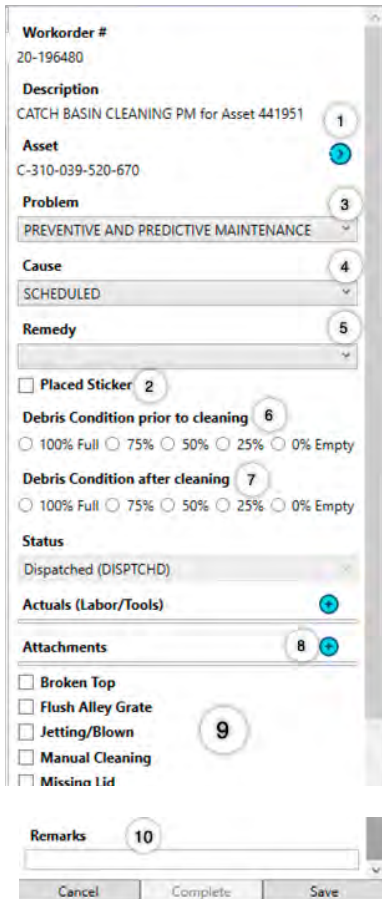


Figure 5 - PM Type Work Order

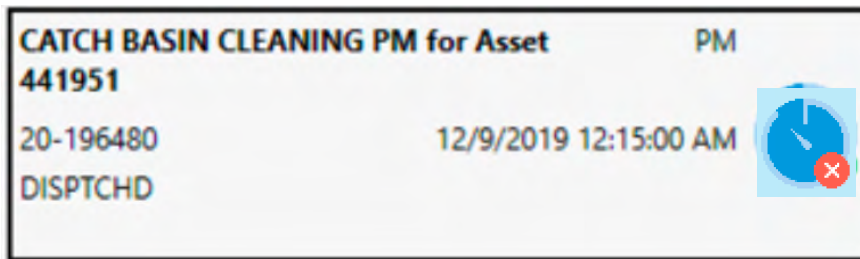


Note: The Failure Hierarchy of Problem/Cause/Remedy is aptly named like that because it is a hierarchy. As such, the attributes must be filled out in that order, first selecting/changing the appropriate Problem value, then for that Problem selecting a Cause and finally selecting a Remedy for that Cause. Trying to select a Remedy without selecting a Problem and a Cause will result in the application showing a blank list of values since none are applicable.

The user can then choose to add attachments if needed by clicking the + sign on the attachments attribute (8) (refer to APPENDIX-7: Managing Attachments).

Finally, depending on the work type and the context, the user may have the option to flag follow up work by checking the appropriate box (9) and entering remarks (10).

Once he's done entering the information on this work order, the user should click on the stop timer button



This will pop up a window with the list of Actuals (Labor and Tool) transactions. The user can select to edit them if needed or at this time click on Complete Work (refer to APPENDIX-4: Editing Actuals). Doing so will display the Status dialog box:

Where the user will be able to update the status date (1), the new status (2) (Only allowable values are shown) and a memo (3) to explain why this status was chosen (usually when selecting something different than complete). He can save that status by clicking Save (4) or cancel the action by clicking Cancel (5)

Once the work order is saved and was marked as Complete, it will be removed from the list and the map icon would be updated to show the complete status.

4. Use Case: Catch Basin Can't Be Located

If a cleaning work order was assigned to a crew and that catch basin is no longer there or if the location shown on the map is way off compared to where the catch basin is actually located, the crew must report this by using the NOT FOUND problem code. Although we must report Travel time for this work order, there is no need to report labor time against this workorder.

REMINDER: Do not forget to Start the timer and record travel time for the specific work order. Else the user will not be able to Complete this work order (in Hold status)

On the Work order detail screen, select the problem code (1)

Workorder #
20-197227

Description
CATCH BASIN CLEANING PM for Asset 60029

Asset
C-329-059-674-774

Problem **1**
PREVENTIVE AND PREDICTIVE MAINTENANCE

Cause **2**
SCHEDULED

Remedy

Placed Sticker

Debris Condition prior to cleaning
 100% Full 75% 50% 25% 0% Empty

Debris Condition after cleaning
 100% Full 75% 50% 25% 0% Empty

and change it to Not Found. Set the Cause (2) to the most appropriate reason (e.g. Map Error, Removed as Part of Redevelopment, Other or Location Description Error)

Workorder #
20-197227

Description
CATCH BASIN CLEANING PM for Asset 60029

Asset
C-329-059-674-774

Problem **1**
NOT FOUND

Cause **2**
MAP ERROR
REMOVED AS PART OF REDEVELOPMENT
OTHER
LOCATION DESCRIPTION ERROR

Debris Condition prior to cleaning
 100% Full 75% 50% 25% 0% Empty

Debris Condition after cleaning
 100% Full 75% 50% 25% 0% Empty

Then select Complete (4) and a new Work Order Complete window will open.

The screenshot shows a 'Work Order' form with the following fields and callouts:

- Workorder #**: 20-197432
- Description**: CATCH BASIN CLEANING PM for Asset 58869
- Asset**: C-322-065-819-624
- Problem**: NOT FOUND (Callout 1)
- Cause**: MAP ERROR (Callout 2)
- Remedy**: (Empty dropdown)
- Placed Sticker**
- Debris Condition prior to cleaning**: 100% Full, 75%, 50%, 25%, 0% Empty
- Debris Condition after cleaning**: 100% Full, 75%, 50%, 25%, 0% Empty
- Status**: Dispatched (DISPTCHD)
- Actuals (Labor/Tools)**: (Add button)
- | Labor | Type |
|----------------------|---------------|
| 02453 | WORK |
| Start-End Time | Duration |
| 3/23/2020 2:55:08 PM | 00:04.6988506 |
- | Labor | Type |
|-------|------|
| 02461 | W |
- Buttons: Cancel, Complete (Callout 4), Save (Callout 3)

In this new window select the New Status of the work order to Hold (4) and if required write a note in the Memo field (6) and finally press Save (7) to complete.

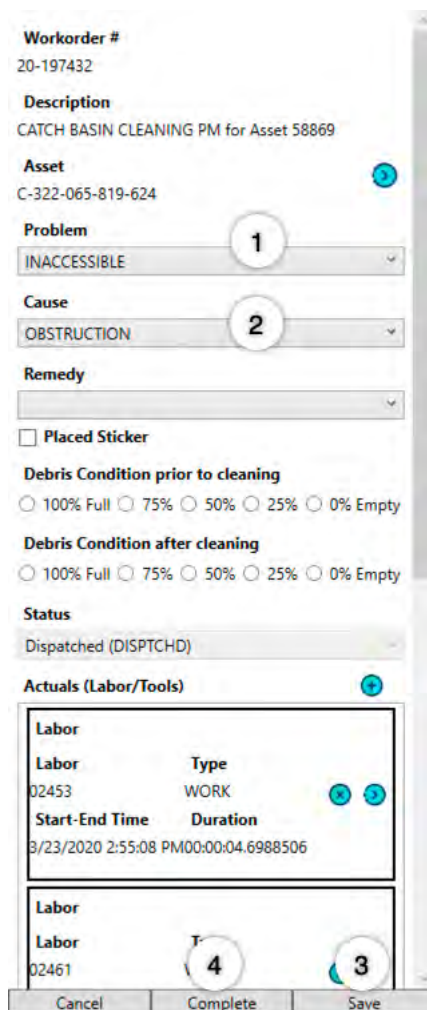
The screenshot shows the 'Work Order Complete' dialog box with the following fields and callouts:

- Status Date**: Monday, March 23, 2020 2:55:31 PM
- New Status**: Complete, Hold (Callout 5)
- Memo**: (Text input field, Callout 6)
- Buttons: Cancel, Save (Callout 7)

5. Use Case: Catch Basin Can't Be Accessed

Similar to the previous situation, if a catch basin to be cleaned is blocked by an obstruction, the crew is to report this condition by changing the problem code (1) to INACCESSSSSIBLE and selecting the cause (2) as Obstruction. Although we must report Travel time for this work order, there is no need to report labor time against this workorder.

REMINDER: Do not forget to Start the timer and record travel time for the specific work order. Else the user will not be able to Complete this work order (in Hold status)



Workorder #
20-197432

Description
CATCH BASIN CLEANING PM for Asset 58869

Asset
C-322-065-819-624

Problem 1
INACCESSSSSIBLE

Cause 2
OBSTRUCTION

Remedy
[Dropdown]

Placed Sticker

Debris Condition prior to cleaning
 100% Full 75% 50% 25% 0% Empty

Debris Condition after cleaning
 100% Full 75% 50% 25% 0% Empty

Status
Dispatched (DISPTCHD)

Actuals (Labor/Tools)

Labor	Type
02453	WORK
Start-End Time	Duration
3/23/2020 2:55:08 PM	00:04.6988506

Labor

Labor	Type
02461	

Cancel Complete (4) Save (3)

Then select Complete (4) and a new Work Order Complete window will open.

In this new window select the New Status of the work order to Hold (4) and if required write a note in the Memo field (6) and finally press Save (7) to complete.

Work Order Complete

Status Date
Monday, March 23, 2020 2:55:31 PM

New Status
 Complete Hold 5

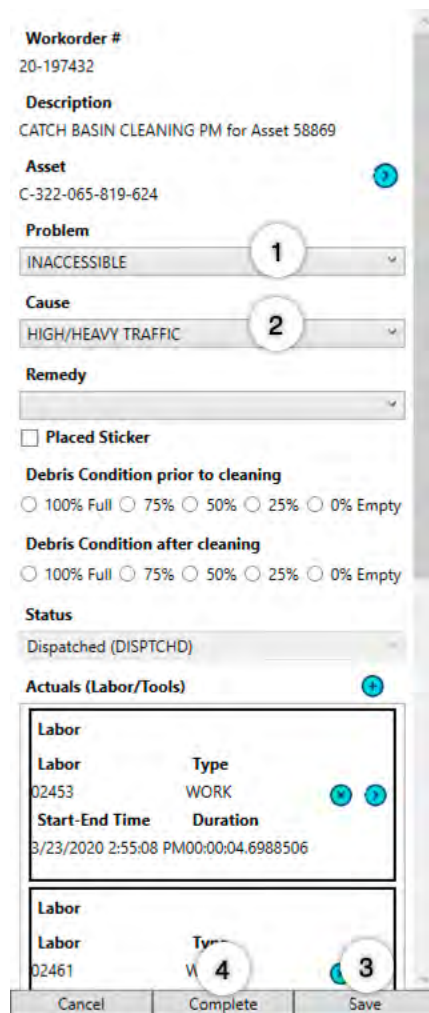
Memo 6

Cancel Save 7

6. Use Case: Catch Basin In Heavy Traffic Area

As in the previous case, the crew is to report this condition by changing the problem code (1) to INACCESSSSSIBLE and selecting the cause (2) as High/Heavy Traffic. Although we must report Travel time for this work order, there is no need to report labor time against this workorder.

REMINDER: Do not forget to Start the timer and record travel time for the specific work order. Else the user will not be able to Complete this work order (in Hold status)



Workorder #
20-197432

Description
CATCH BASIN CLEANING PM for Asset 58869

Asset
C-322-065-819-624

Problem
INACCESSSSSIBLE (1)

Cause
HIGH/HEAVY TRAFFIC (2)

Remedy
[Empty dropdown]

Placed Sticker

Debris Condition prior to cleaning
 100% Full 75% 50% 25% 0% Empty

Debris Condition after cleaning
 100% Full 75% 50% 25% 0% Empty

Status
Dispatched (DISPTCHD)

Actuals (Labor/Tools)

Labor	Type	Start-End Time	Duration
02453	WORK	3/23/2020 2:55:08 PM	00:04.6988506

Labor
02461

Type
W (4)

Save (3)

Cancel Complete Save

Then select Complete (4) and a new Work Order Complete window will open.

In this new window select the New Status of the work order to Hold (4) and if required write a note in the Memo field (6) and finally press Save (7) to complete.

Work Order Complete

Status Date
Monday, March 23, 2020 2:55:31 PM

New Status
 Complete Hold 5

Memo 6

Cancel Save 7

7. Use Case: Catch Basin Blocked By Construction

As in the previous case, the crew is to report this condition by changing the problem code (1) to INACCESSSSSIBLE and selecting the cause (2) as Construction. Although we must report Travel time for this work order, there is no need to report labor time against this workorder.

REMINDER: Do not forget to Start the timer and record travel time for the specific work order. Else the user will not be able to Complete this work order (in Hold status)

The screenshot shows a mobile application interface for reporting a work order. The form contains the following fields and options:

- Workorder #**: 20-197432
- Description**: CATCH BASIN CLEANING PM for Asset 58869
- Asset**: C-322-065-819-624
- Problem**: INACCESSSSSIBLE (marked with a circled 1)
- Cause**: CONSTRUCTION (marked with a circled 2)
- Remedy**: (empty dropdown)
- Placed Sticker**
- Debris Condition prior to cleaning**: Radio buttons for 100% Full, 75%, 50%, 25%, 0% Empty
- Debris Condition after cleaning**: Radio buttons for 100% Full, 75%, 50%, 25%, 0% Empty
- Status**: Dispatched (DISPTCHD)
- Actuals (Labor/Tools)**: A table with columns for Labor, Type, Start-End Time, and Duration.

Labor	Type	Start-End Time	Duration
02453	WORK	3/23/2020 2:55:08 PM	00:04.6988506
- Bottom Bar**: Buttons for Cancel, Complete (marked with a circled 4), and Save (marked with a circled 3).

Then select Complete (4) and a new Work Order Complete window will open.

In this new window select the New Status of the work order to Hold (4) and if required write a note in the Memo field (6) and finally press Save (7) to complete.

Work Order Complete

Status Date
Monday, March 23, 2020 2:55:31 PM

New Status
 Complete Hold 5

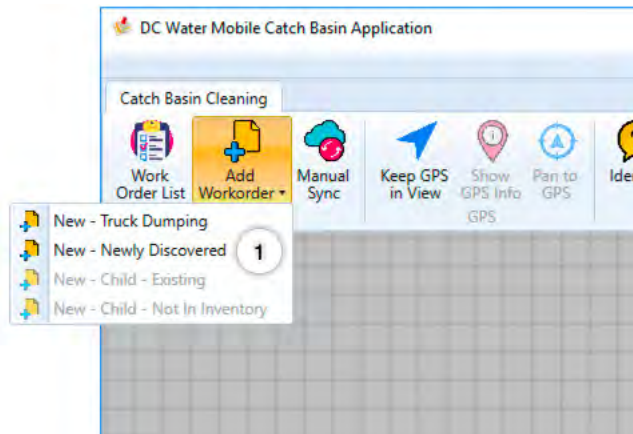
Memo
6

7

Cancel Save

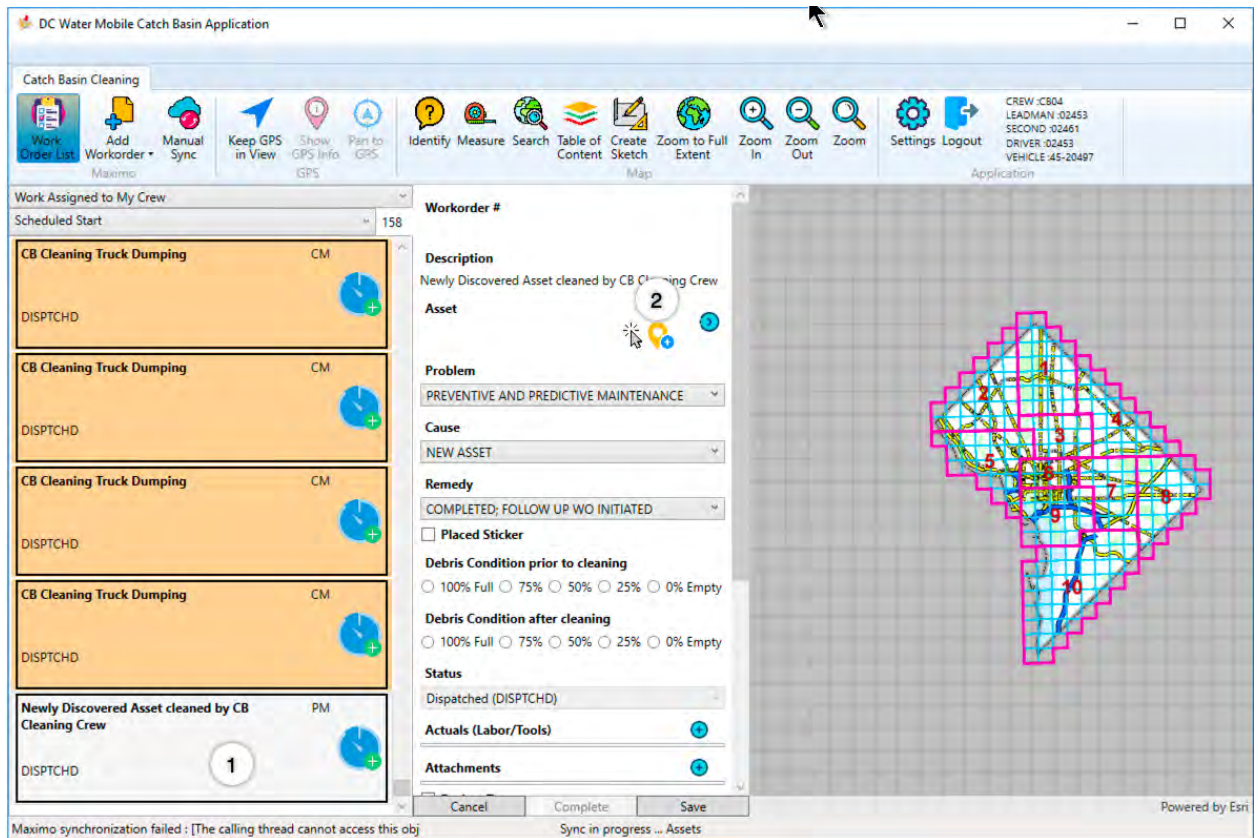
8. Use Case: Catch Basin Not Shown on the Map

It may happen that when performing work at a location that the crew will realize that there is a catch basin in the field that is not showing on the map. In that case, the crew is required to clean this newly discovered catch basin by going to the task menu and selecting the option **New – Newly Discovered (1)** from the menu.

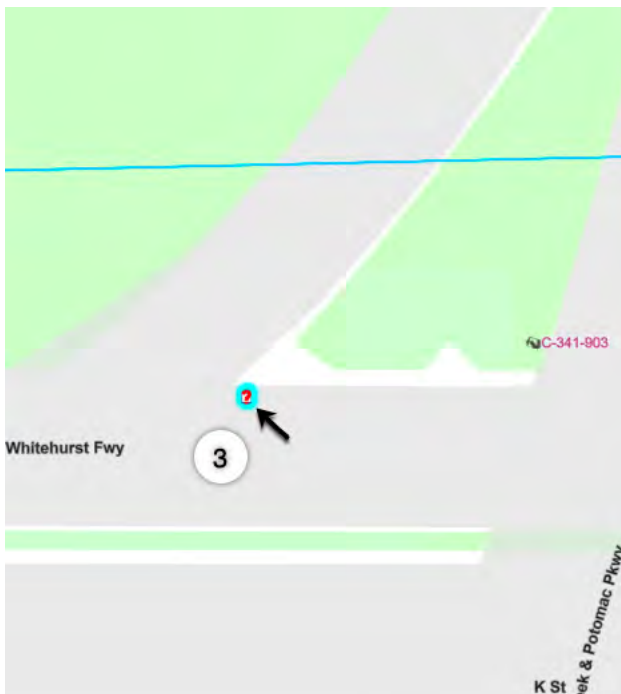


Note: The user must make sure that the map is zoomed in to a level that will allow the placement of the new catch basin with relatively good accuracy. He should also make sure that the location he plans to create the new catch basin is in view.

The application will create a new work order at the bottom of the list on the left (1) and show the work order details on the right.



The user must then use the location indicator tool (2) to locate the asset by clicking on the map. (3)



Note: Hitting Esc will cancel the operation.

The user can then proceed to completing the work order information and, by pressing (1) in Work Order form to open Asset Details information, asset information can be completed in the normal fashion (2-11).

Workorder #

Description
Newly Discovered Asset cleaned by CB Cleaning (1)

Asset
NCB04032320020606

Problem
PREVENTIVE AND PREDICTIVE MAINTENANCE

Cause
NEW ASSET

Remedy
COMPLETED; FOLLOW UP WO INITIATED

Placed Sticker

Debris Condition prior to cleaning
 100% Full 75% 50% 25% 0% Empty

Debris Condition after cleaning
 100% Full 75% 50% 25% 0% Empty

Status
Dispatched (DISPTCHD)

Actuals (Labor/Tools)

Attachments

Broken Top
 Flush Alley Grate
 Jetting/Blown
 Manual Cleaning
 Missing Lid
 Needs Cheek Block
 Needs Masonry
 Oil Spill/Illegal Dumping

Asset Tag
NCB04032320020606

Type
UNKNOWN (2)

Top Material
Concrete (3)

Top Thickness
4" (4)

Grate Type
(5)

Number of Chambers
0 (6)

Number of Throats
0 (7)

Location Detail

Owner
DC WASA

Cleaning Responsibility
DC WASA

Is Water Quality? (8)
 Is In MS4? (9)
 Is Corner CB?
 Has Biofilter?

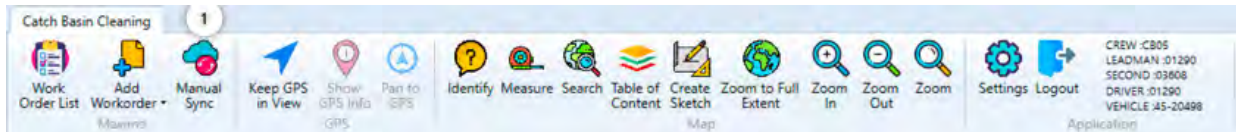
Flow Restrictor Type

Has Sump? (11)
 Has Water Seal?

Cancel Complete Save Cancel Save

9. Use Case: Emergency and Investigation Work Orders

When an Emergency or Investigation work order is dispatched to a crew, it will show up on the list of assigned work after the crew has synchronized their data. If the work order doesn't show up and the crew was notified of the assignment by their supervisor, the crew should complete whatever work order they may have started completing in the application and then hit the Manual Sync (1) button on the Ribbon Bar:



The process of completing these work orders is basically the same as for preventive maintenance work with the exception that typically these work orders are not associated with an asset but with a location.

So when displaying the attributes of the work order, the asset record will show options to either select an existing asset from the map (1) or create a newly discovered asset (2) by clicking on the map.



In most cases the resolution of the condition at the root of the Investigation/Emergency will require cleaning one or more catch basins. In order to track which catch basins are cleaned in the year, the crew will need to create one or more children work orders. In that case, the asset is left blank on the parent work order (EMERG/INV) and only the failure hierarchy and the travel time will be recorded on the parent.

The process from a high level to complete EMERG/INV work orders that require cleaning catch basins is:

1. Start the timer on the EMERG/INV and travel to that location;
2. Stop the timer, change the work type to Travel for both crew members, Pause Work and Save;

For Each Catch Basin cleaned on this EMERG/INV:

3. Reselect the EMERG/INV work order;

4. Create a **New – Clean – Existing** if the catch basin is showing on the map or **New – Clean- Not In Inventory** if it doesn't. The new work order will show up at the bottom of the list on the left;

Note: Do not use New – Clean – Newly Discovered since this will not create a child to the EMERG/INV work order

5. DO NOT START THE TIMER. Select the Asset using the select tool or create one using the pencil tool. Complete the asset information and Save;

Note: When adding a catch basin that is not in the inventory, the application stays on the Map tab once the map is clicked and the asset created. Click on the Attributes tab to see the asset information sheet, not the button on the work order list.

6. Start the Timer and go do the work;
7. Complete the failure hierarchy, selecting Resulted from EMERG or INV as the cause and the correct remedy. Complete other work order information
8. Stop the timer, Complete Work, Accept the Complete Status and Save;
9. Repeat from step 3 for each catch basin cleaned;

Once all the children cleaning work orders are entered:

10. Reselect the EMERG/INV work order;
11. Complete the failure hierarchy by setting the cause and remedy;
12. Change the status to Complete and Save;

10. Use Case: Dumping

When the crew must go and dump the content of the truck, they need to complete any work order they have started, and then the user may create a New Work Order for Truck Dumping from the ribbon bar menu as shown in Figure 6

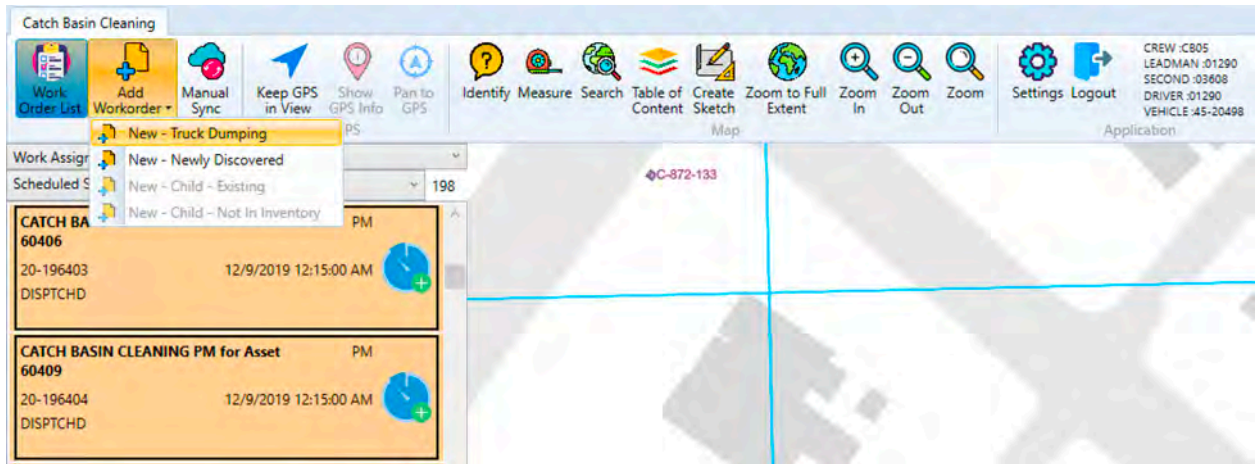


Figure 6 - Creation of New WO for Truck Dumping

Once the crew member selects this option the New Work Orders details form for New Truck dumping will open as shown in Figure 7.

The crew should start the timer (2) to record the time it takes to go there and stop it once on location, pausing the work. They should estimate how much debris they are dumping and enter it on the work order (3) and then save (4).

The crew member can fill in the form as required.

Labor time (WORK or TRAVEL) can be entered as described in Section APPENDIX-3: Starting & Stopping the Timer to Add Labor/Tool. The form information which is updated can be saved by pressing the Save button.

Once all information is entered, and the work order must be finalized by pressing the Complete button. Unless all mandatory fields are entered the Complete button will not be active.

Once the Complete button is pressed a new Work Order Completion Form will open as shown in Figure 8. The crew member has the options to complete the Work Order with the status options of Complete, Hold or Cancel. Also, a memo note can be added. Once the Save button is pressed the work order will be finalized.

Workorder #

Description
CB Cleaning Truck Dumping

Estimate of Volume of Debris Dumped
0

Problem
TRUCK IS FULL

Cause
TRUCK IS FULL

Remedy
EMPTY TRUCK

Status
Dispatched (DISPTCHD)

Actuals (Labor/Tools) +

Attachments +

Remarks

Cancel Complete Save

Figure 7 - New Work Order Details for Truck Dumping

Work Order Complete

Status Date
Friday, February 14, 2020 11:09:55 AM

New Status
 Complete Hold Cancel

Memo

Cancel Save

Figure 8 – Work Order Completion Form

11. Use Case: End of Day

At the end of the day, the crew should synchronize their data and then exit the application using the main menu (Logout) or the X at the top right of the application.

12. Opening a Work Order by WO Type:

Opening an EMERG (or INVESTIGATION) Type Work Order

The process of completing these work orders is basically the same as for preventive maintenance work with the exception that typically these work orders are not associated with an asset but with a location.

If you click any Work Order in the WO List the details for the specific work order will be shown starting with the Workorder#, Description, Location, Contact etc.

For an EMERG (or INV) Work Order example shown in Figure 9 you can see this information in detail.

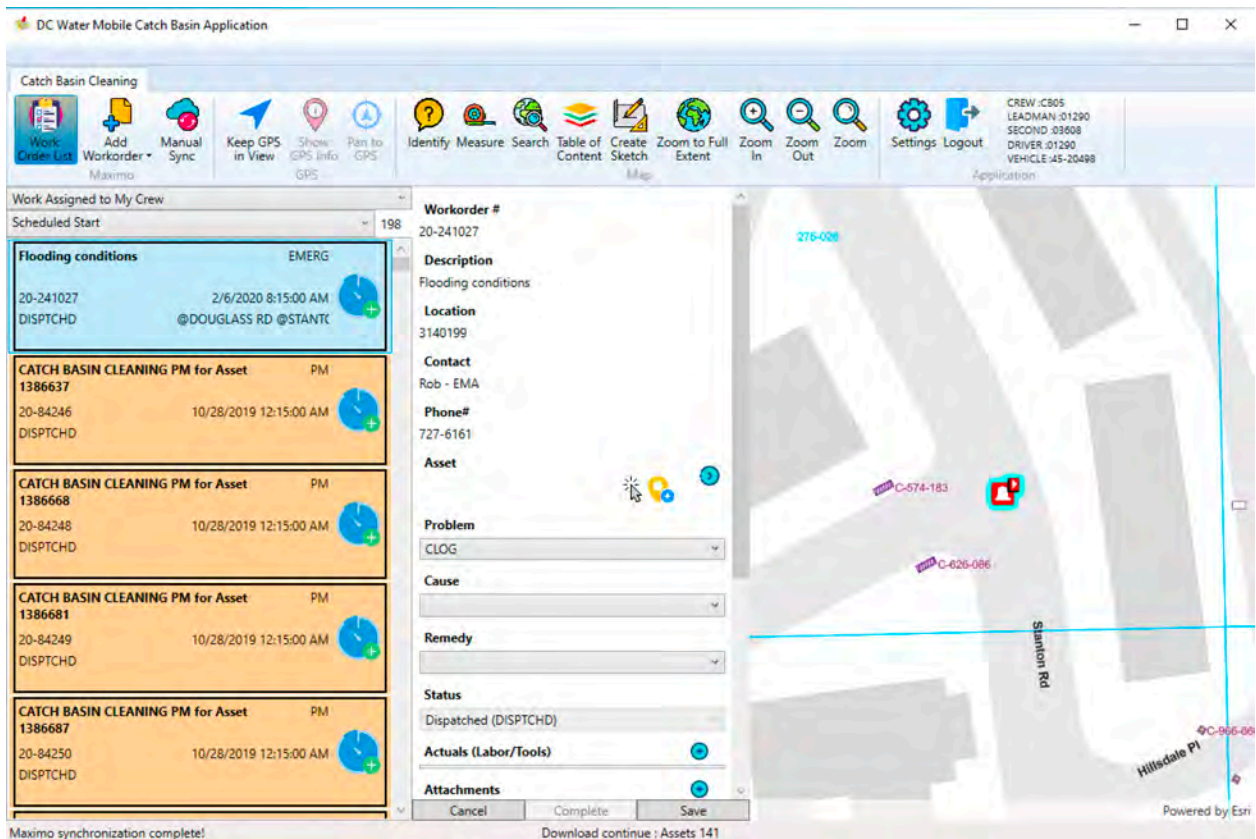


Figure 9 – Details of an EMERG Work Order in CB App

In Figure 10, the details of an EMERG work order are given. So when displaying the attributes of the work order, the asset record will show options to either select an existing asset from the map or create a newly discovered asset by clicking on the map.

In some cases the resolution of the condition at the root of the Investigation/Emergency will require the creation of multiple children work orders to track the work done on multiple assets. In that case, the asset would be left blank on the parent work order and the options of the task menu to create work orders would be used.

Workorder #
20-241027

Description
Flooding conditions

Location
3140199

Contact
Rob - EMA

Phone#
727-6161

Asset

Problem
CLOG

Cause

Remedy

Status
Dispatched (DISPTCHD)

Actuals (Labor/Tools)

Attachments

- Broken Top
- Flush Alley Grate
- Jetting/Blown
- Manual Cleaning
- Missing Lid
- Needs Cheek Block
- Needs Masonry
- Oil Spill/Illegal Dumping
- Top Needs Reset
- Tree Roots
- Vacuuming
- Walls Need Repair

Remarks

Cancel Complete Save

Figure 10 – EMERG Work Order details

The actions which can be performed on this EMERG work order are as follows:

- The Cause and Remedy fields can be chosen
- In this example work order the asset is not defined, so the user has the ability to either relate this work order to an existing asset on the map (pressing the Arrow ((shown in Figure 11) and then selecting the asset on the map), or the user can create a new asset (subject to QC by DETS) pressing the yellow position indication selector button (shown in Figure 12) and choosing the location where this newly discovered asset is on the map. The newly discovered asset is highlighted in light blue on the map and the newly discovered asset is given an Asset Tag starting with NCB which will later be submitted to DETS for QC to be given its final asset tag number.



Figure 11 - Selection Arrow



Figure 12 - Position Indication Selector

- If the user is to select an existing asset from the map, the user should make sure the map is zoomed in at an adequate zoom level and showing the asset that needs to be selected BEFORE using the select tool. If they realize that they need to cancel out of the operation, they can use the ESC key.
- If the user creates a new asset on the map, the application will create a temporary asset tag and display the asset attributes that then must be populated from scratch. Some default values may be populated but it is the user's responsibility to verify and update all of the required attributes.
- Labor and Tool time can be entered into this work order either by starting the timer (shown in Figure 13) and stopping the timer which is active shown in Figure 14.



Figure 13 - Timer in stand-by mode (Green)



Figure 14 - Timer in active mode (recording time elapsed) (Red)

- After the timer is stopped Labor and Tool time records are created as shown in Figure 15.



Figure 15 - Labor and Tool time records

- The Labor and Tool time records can be edited pressing the blue right arrow and the fields which can be edited are shown in Figure 16 and Figure 17.

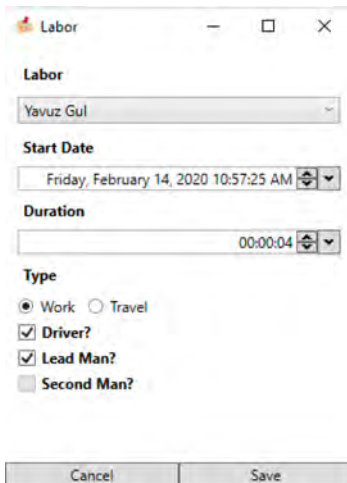


Figure 16 - Editing Time Record for Labor

Tool

Tool
45-20067

Quantity
1

Duration
00:00:04

Cancel Save

Figure 17 - Editing Tool Record for Labor

- There are 12 types of follow-up work order types which can be created once the work order is completed. These are selectable in the work order form and are shown in Figure 18.

- Broken Top
- Flush Alley Grate
- Jetting/Blown
- Manual Cleaning
- Missing Lid
- Needs Check Block
- Needs Masonry
- Oil Spill/Illegal Dumping
- Top Needs Reset
- Tree Roots
- Vacuuming
- Walls Need Repair

Figure 18 – Follow-up work order types

Opening a PM Type Work Order

When you select a PM work order, the Asset for the given PM work order is highlighted in light blue on the map as shown in Figure 19.

The details of the PM Work Order can also be seen in the same figure where you can see the Workorder#, Description, Location, Contact etc. information in detail.

In a PM work order, there is always an Asset with an Asset Tag number displayed for the PM work order (in this case the asset tag number is C-310-039-520-670 as an example). In Figure 20, a focused view of the WO details are shown for the same work order.

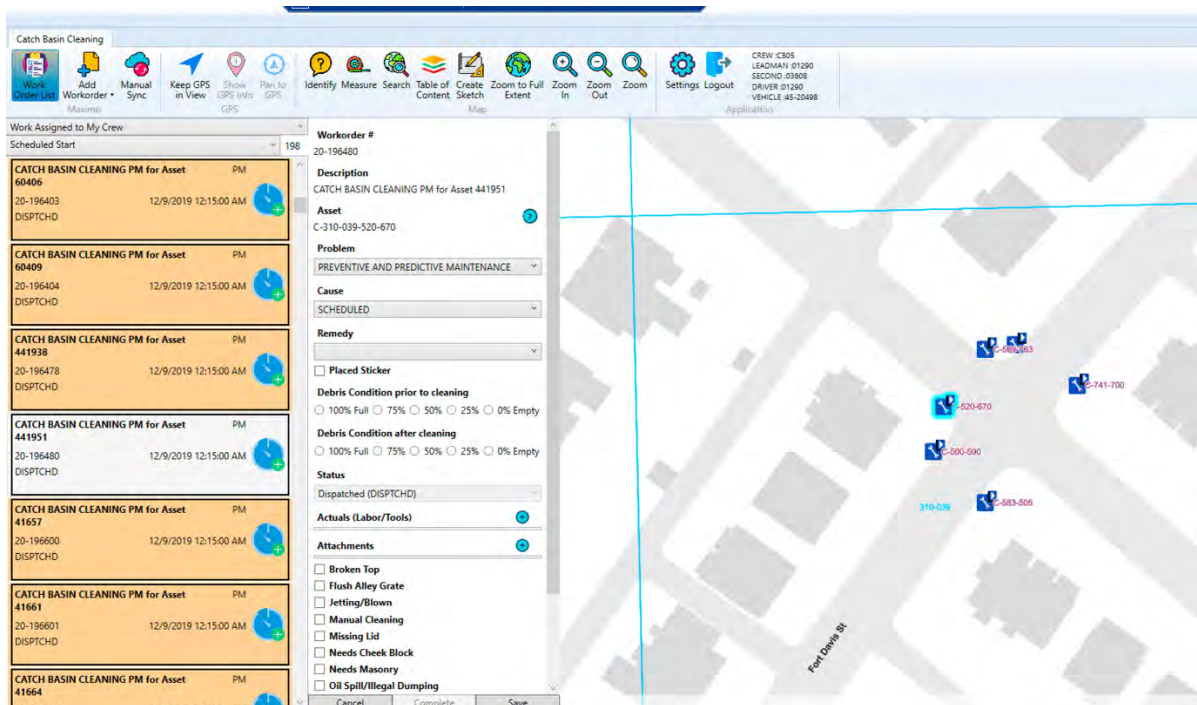


Figure 19 - PM Type Work Order

Workorder #
20-196480

Description
CATCH BASIN CLEANING PM for Asset 441951

Asset ➔
C-310-039-520-670

Problem
PREVENTIVE AND PREDICTIVE MAINTENANCE

Cause
SCHEDULED

Remedy
[Empty dropdown]

Placed Sticker

Debris Condition prior to cleaning
 100% Full 75% 50% 25% 0% Empty

Debris Condition after cleaning
 100% Full 75% 50% 25% 0% Empty

Status
Dispatched (DISPTCHD)

Actuals (Labor/Tools) +

Attachments +

Broken Top
 Flush Alley Gate
 Jetting/Blown
 Manual Cleaning
 Missing Lid

Figure 20 - Details for PM Type Work Order

Furthermore, asset details can be observed by pressing the blue colored small right arrow as shown in Figure 21 and focused details of the asset details in Figure 22.

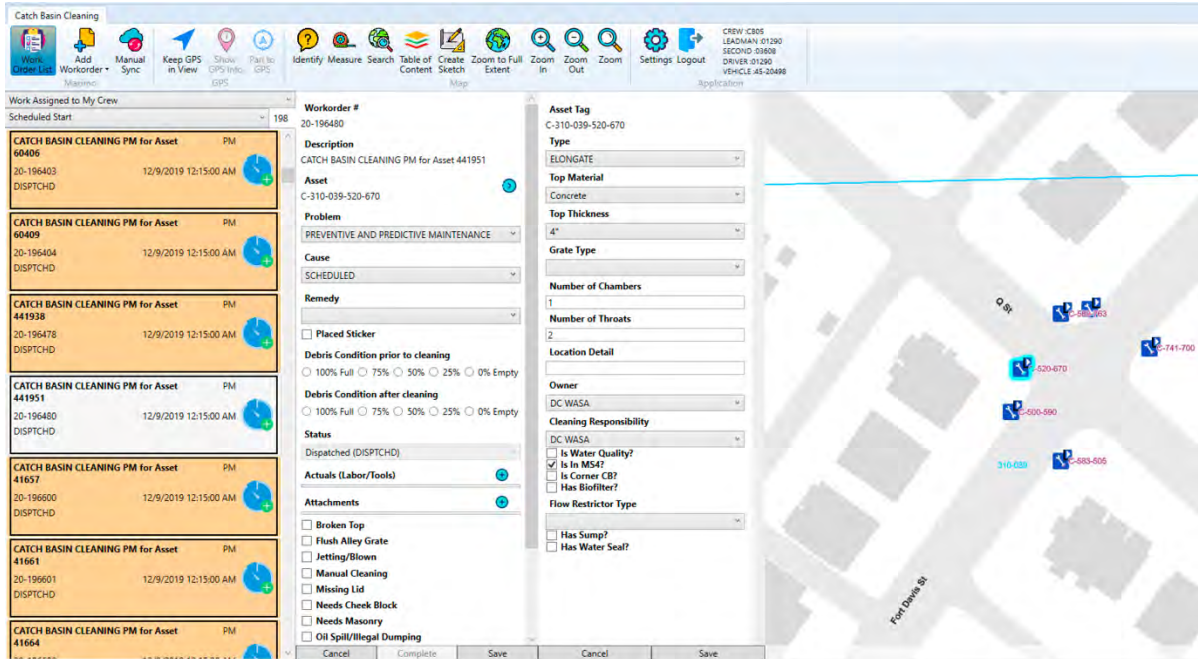


Figure 21 - Details of Asset for specific PM Work Order

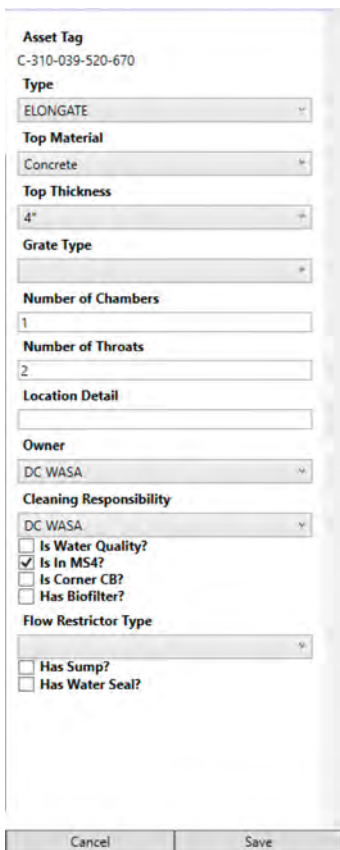


Figure 22 - Asset Details focus detail

The actions which can be performed on this PM work order are as follows:

- The Cause and Remedy fields can be chosen
- Labor and Tool time can be entered into this work order either by starting the timer (shown in Figure 13) and stopping the timer which is active shown in Figure 14.



Figure 23 - Timer in stand-by mode (Green)



Figure 24 - Timer in active mode (recording time elapsed) (Red)

- After the timer is stopped Labor and Tool time records are created as shown in Figure 15.

Actuals (Labor/Tools)	
Labor	
Labor	Type
01290	WORK
Start-End Time	Duration
2/12/2020 12:07:22 PM	00:27.0068242
Labor	
Labor	Type
03608	WORK
Start-End Time	Duration
2/12/2020 12:07:22 PM	00:27.0068242
Tool	
Tool	
45-20498	
Quantity	Tool Hours
1	0.007501895611111111

Figure 25 - Labor and Tool time records

- The Labor and Tool time records can be edited pressing the blue right arrow and the fields which can be edited are shown in Figure 16 and Figure 17.

Figure 26 - Editing Time Record for Labor

Figure 27 - Editing Tool Record for Labor

- There are 12 types of follow-up work order types which can be created once the work order is completed. These are selectable in the work order form and are shown in Figure 18 **Error! Reference source not found.**

- Broken Top
- Flush Alley Grate
- Jetting/Blown
- Manual Cleaning
- Missing Lid
- Needs Cheek Block
- Needs Masonry
- Oil Spill/Illegal Dumping
- Top Needs Reset
- Tree Roots
- Vacuuming
- Walls Need Repair



Figure 28 – Follow-up work order types

13. Creating a New Work Order for Newly Discovered Asset in the field

The user may create a new work order for Newly Discovered Assets from the ribbon bar, by selecting the second option **New – Newly Discovered** from the pulldown menu. Once this option is selected a Work Order detail form will open as shown in Figure 29.

The screenshot shows a 'Workorder #' form with the following fields and options:

- Description:** Newly Discovered Asset cleaned by CB Cleaning Crew
- Asset:** A map view with a yellow location selection indicator and a blue location pin.
- Problem:** PREVENTIVE AND PREDICTIVE MAINTENANCE
- Cause:** NEW ASSET
- Remedy:** COMPLETED; FOLLOW UP WO INITIATED
- Placed Sticker:**
- Debris Condition prior to cleaning:** Radio buttons for 100% Full, 75%, 50%, 25%, and 0% Empty.
- Debris Condition after cleaning:** Radio buttons for 100% Full, 75%, 50%, 25%, and 0% Empty.
- Status:** Dispatched (DISPTCHD)
- Actuals (Labor/Tools):** A section with a blue plus icon.
- Attachments:** A section with a blue plus icon.
- Checklist:** A list of checkboxes for: Broken Top, Flush Alley Grate, Jetting/Blown, Manual Cleaning, Missing Lid, Needs Check Block, Needs Masonry, and Oil Spill/Illegal Dumping.
- Buttons:** Cancel, Complete, and Save.

Figure 29 - New Work Order Details for Newly Discovered Asset in the field

A new asset is added to the work order using the below yellow position selection indicator (as shown in Figure 12) and pressing the location on the map. The asset is highlighted in light blue on the map (as shown in Figure 30) and the newly discovered asset is given an Asset Tag starting with NCB which will later be submitted to DETS for QC to be given its final asset tag number.

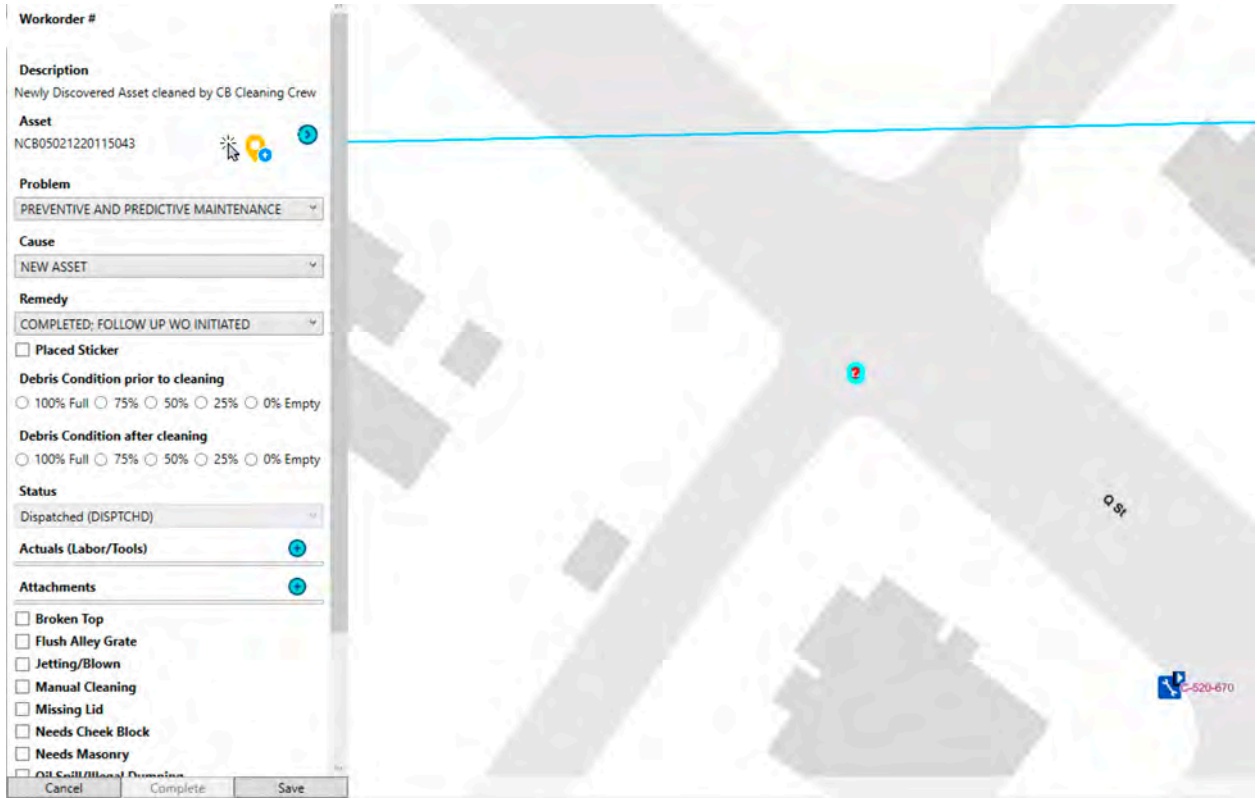


Figure 30 - Selecting the position of a Newly Discovered Asset on the field using the position indication selector

Or you can choose an asset from the map directly using the arrow (as shown in Figure 11), and the chosen asset from the map will be displayed C-310-039-520-670 (given as an example) and highlighted as light blue on the map as shown in Figure 32.

In order to update or enter the new asset details, the crew member can press the blue arrow button in work order form in the Asset line as shown in Figure 31. Upon pressing the blue arrow button, the Asset Details form will display as shown in Figure 22. The crew member can update the Asset Details form and save the form pressing the Save button.

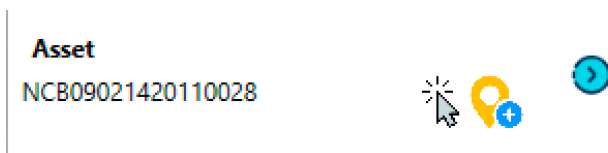


Figure 31 – Blue arrow button to open Asset Details form

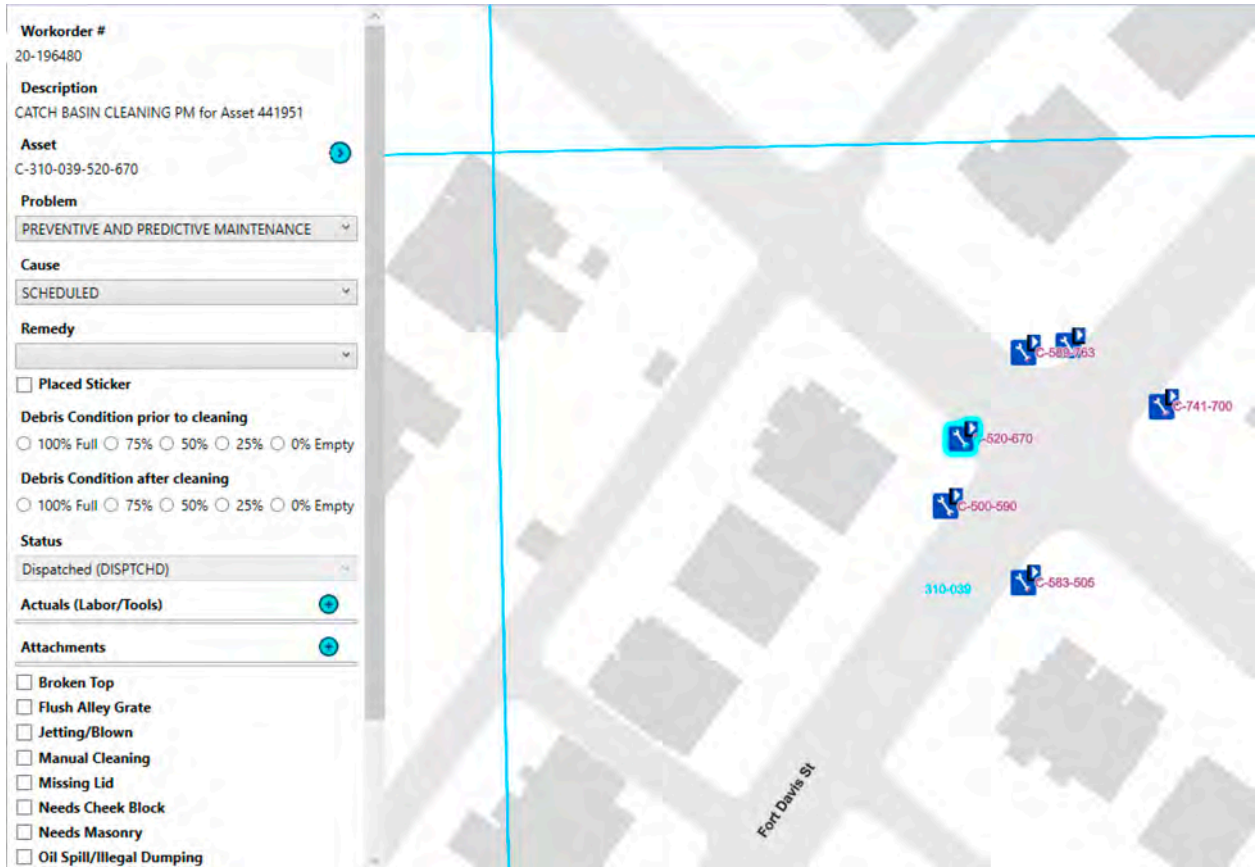


Figure 32 - Selecting the position of a Newly Discovered Asset on the field using the select arrow among the assets in the field map

The actions which can be performed on this New Work Order for Newly Discovered Asset order are as follows:

- The Cause and Remedy fields can be chosen
- Labor and Tool time can be entered into this work order either by starting the timer (shown in Figure 13) and stopping the timer which is active shown in Figure 14.



Figure 33 - Timer in stand-by mode (Green)



Figure 34 - Timer in active mode (recording time elapsed) (Red)

- After the timer is stopped Labor and Tool time records are created as shown in Figure 15Error! Reference source not found..

Actuals (Labor/Tools)

Labor	
Labor	Type
01290	WORK
Start-End Time	Duration
2/12/2020 12:07:22 PM	00:27.0068242

Labor	
Labor	Type
03608	WORK
Start-End Time	Duration
2/12/2020 12:07:22 PM	00:27.0068242

Tool	
Tool	Tool Hours
45-20498	
Quantity	Tool Hours
1	0.007501895611111111

Figure 35 - Labor and Tool time records

- The Labor and Tool time records can be edited pressing the blue right arrow and the fields which can be edited are shown in Figure 16 and Figure 17.

Labor

Labor
Yavuz Gul

Start Date
Friday, February 14, 2020 10:57:25 AM

Duration
00:00:04

Type
 Work Travel
 Driver?
 Lead Man?
 Second Man?

Cancel Save

Figure 36 - Editing Time Record for Labor

Figure 37 - Editing Tool Record for Labor

- There are 12 types of follow-up work order types which can be created once the work order is completed. These are selectable in the work order form and are shown in Figure 38. **Error! Reference source not found..**

- Broken Top
- Flush Alley Grate
- Jetting/Blown
- Manual Cleaning
- Missing Lid
- Needs Check Block
- Needs Masonry
- Oil Spill/Illegal Dumping
- Top Needs Reset
- Tree Roots
- Vacuuming
- Walls Need Repair

Figure 38 – Follow-up work order types

14. Filtering Work Orders

On the main page the Work Orders shown in the Work Order List can be filtered according to the following from the selections on top of the Work Order List as shown in Figure 39 and Figure 40 :

- Work Assigned to My Crew
- Closed Workorder
- PM Work
- Emergency Work
- Non PM Work

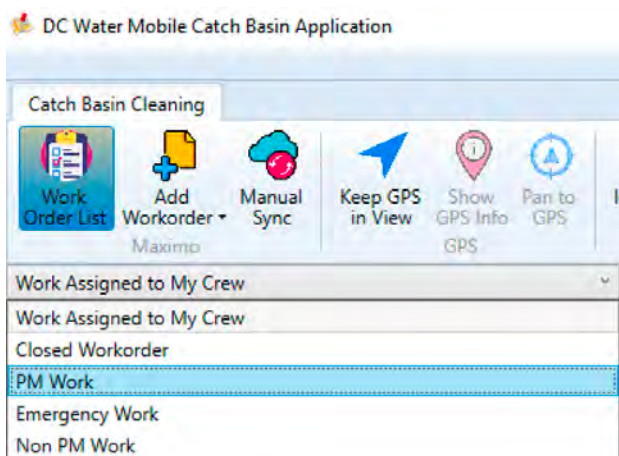


Figure 39 – Filtering Work Orders – 1

Or filter by:

- Scheduled Start
- Status
- Work Type

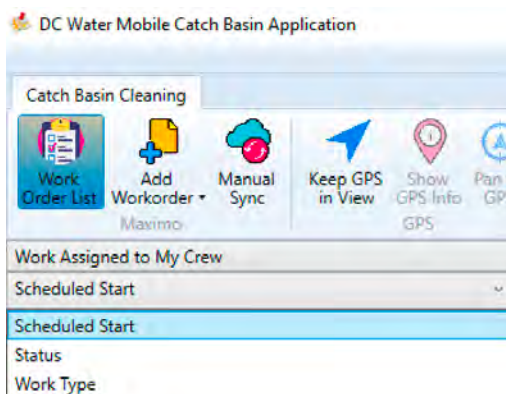


Figure 40 – Filtering Work Orders - 2

15. APPENDIXES

APPENDIX – 1: Exceptional Cases Causing Error During Login

Below we describe the exceptional cases which will lead to an error warning during login. We explain what you should do to successfully login and open the application main screen.

Exceptional Cases:

- **Wrong password:**
If you have entered a wrong password, you will get the below warning shown in Figure 41. Enter your username and password again.

If this still does not work, please ask DC Water IT Help Desk for a new password.



Figure 41 - Login password error warning pop-up

- **Maximo service error:**
If your username/password is correct, and if you are using the CB App in online mode, the CB App will try to connect to the Maximo asset management system. If the online network is available, but cannot access asset management system (Maximo), you will receive the following error shown in Figure 42.

In this case please contact the IT Help Desk and indicate that you are getting a Maximo service error.

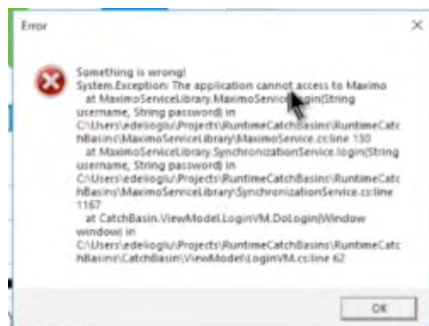


Figure 42 - Login error due to Maximo access error

- **No Labor Craft Rate assignment error:**

If your user credentials are not assigned a proper labor craft rate, you will not be able to login to the CB App. In this case, you will get an error as shown in Figure 43.

Please contact your Manager to be assigned a proper labor craft rate. Labor craft rates are one of the following options: SSWR, SSLR, SSWL, SCRW, CNRW

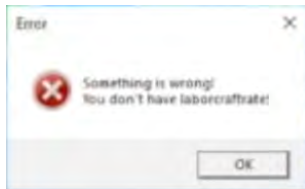


Figure 43 - Login error due to undefined Labor Craft Rate for crew member

- **No Crew assignment error**

If your user credentials are not assigned to a crew, you will not be able to login to the CB App. In this case, you will get an error as shown in Figure 44.

Please contact your Manager to be assigned to a crew.

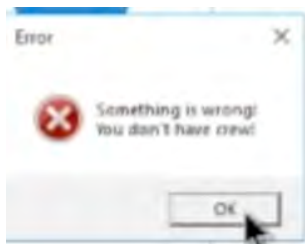


Figure 44 - Login error due to undefined Crew assignment for crew member

APPENDIX – 2: The CB App Menu Bar (top ribbon bar):

The Menu Bar ribbon located on the top of the application, provides access to the functionality of the CB app.

In the PM mode of the CB App, the tab heading is labeled as ‘Catch Basin Cleaning’ (see Figure 45).

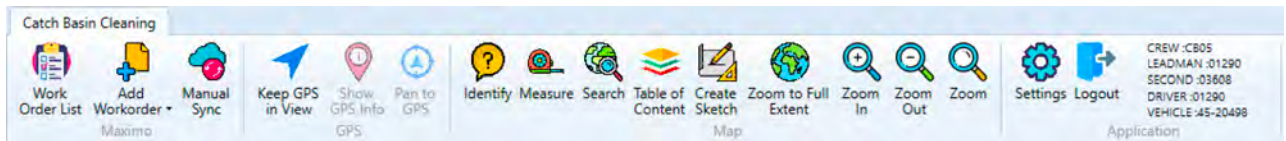


Figure 45 – CB App ribbon menu bar for PM app mode

Whereas for the INSP mode of the CB App, the tab heading is labeled as ‘Catch Basin Inspection’ (see Figure 46).

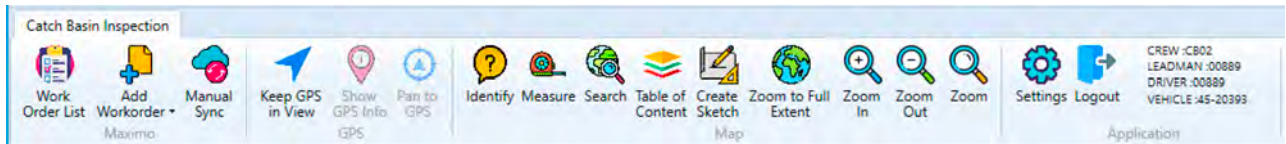


Figure 46 - CB App ribbon menu bar for INSP app mode

The buttons in the menu bar, are grouped into 3. The first group is **Maximo operations** as shown in Figure 47:



Figure 47 - CB App ribbon menu bar (part-1) displaying Maximo and GPS functionality

The Maximo operations which can be selected are as follows:

1. **Work Order List:**

When the user presses this button the list of assigned work orders for relevant crew or crew CB00 will be displayed on the screen. The EMERG work orders, followed by INV work orders will take precedence in the list of displayed work orders.

2. **Add Workorder** for PM Mode of CB App operation:

The user can create a new work order on the field using the Add Workorder button.

As shown in Figure 48 for PM mode of operation for CB App, there are 4 types of work orders which can be created in PM mode.

If the user selects a **PM** (preventive maintenance) type work order from the Work Order List, then either a **New – Truck Dumping** or **New – Newly Discovered** work order can be created.

If the user selects an **EMERG** (emergency) or **INV** (investigation) type work order from the Work Order List, then a **New – Child - Existing** or **New – Child – Not In Inventory** work order can be created.

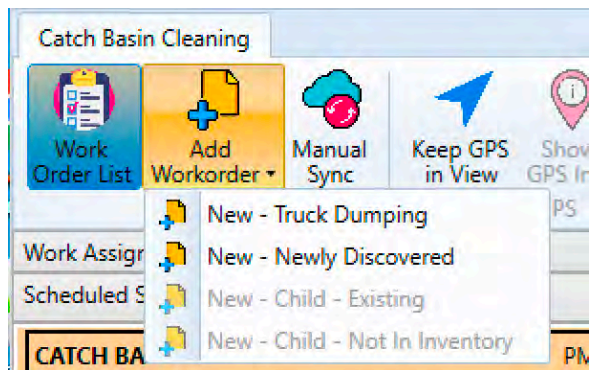


Figure 48 - Add Workorder dropdown menu for PM mode of operation of CB App

3. **Add Workorder** for INSP Mode of CB App operation:

The user can create a new work order on the field using the Add Workorder button.

As shown in Figure 49 for INSP mode of operation for CB App, there is only 1 type of work order which can be created in INSP mode and this is **Inspect – Newly Discovered**.



Figure 49 - Add Workorder dropdown menu for INSP mode of operation of CB App

4. **Manual Sync:**

When the user has network (Internet) access and therefore is online, the Manual Sync button can be used to start Maximo work order synchronization at any time. If this button is not used, the CB App will synchronize at pre-defined time intervals as determined by the CB App Administrator.

The GPS operations which can be selected (refer to Figure 47Figure 45) are as follows:

5. **Keep GPS in View:**

If GPS is enabled on the GETAC machine pressing this button will zoom the view into the current location where the user is with the GETAC machine. The GPS location will also be shown on the right bottom of the status bar.

6. **Show GPS Info:**

This button shows the GPS Info.

7. **Pan to GPS:**

This button when pressed will allow the map to follow the GPS position of the GETAC.

The second group is Map operations as shown in Figure 50:

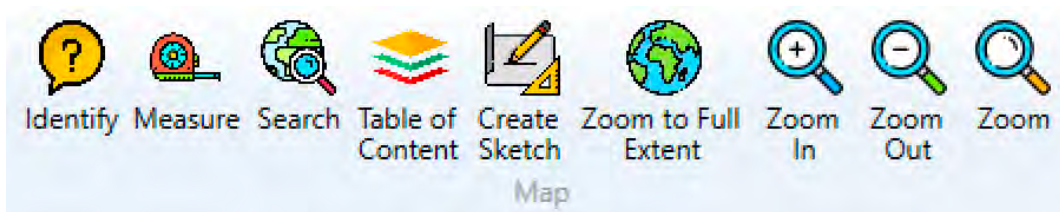


Figure 50 - CB App ribbon menu bar (part-2) displaying Map functionality

The Map operations which can be selected (refer to Figure 47Figure 45) are as follows:

8. **Identify:**

Shows the attributes of chosen map object.

9. **Measure:**

The measure button can be used to perform measurement operations on the map. Referring to Figure 51, at the left bottom the user can choose Length, Area, Feature (object's surface area).



Figure 51 - Measurement functionality icons on bottom status bar

On the right hand of the bottom ribbon the measurement unit can be selected to the desired setting for feet, inches, meters, yards, etc. or corresponding area units. There is also the undo, redo, and delete buttons for the currently operated measurement. In order to do a length measurement, select the Length button on the left bottom of the ribbon bar, and then on the map start clicking the points to create the path whose distance you would like to measure. The measurement will be shown in the left bottom ribbon bar right next to the Length, Area buttons. The measurement unit shown/selected on the right side of the ribbon bar from the drop-down menu.

Similarly, to perform an area measurement a minimum of 3 points or more have to be selected (refer to Figure 52). The area and the measurement unit will be in the ribbon bar on the left bottom and right bottom side respectively. The trash icon on the right bottom side of the ribbon bar is used to clear out any measurement display.

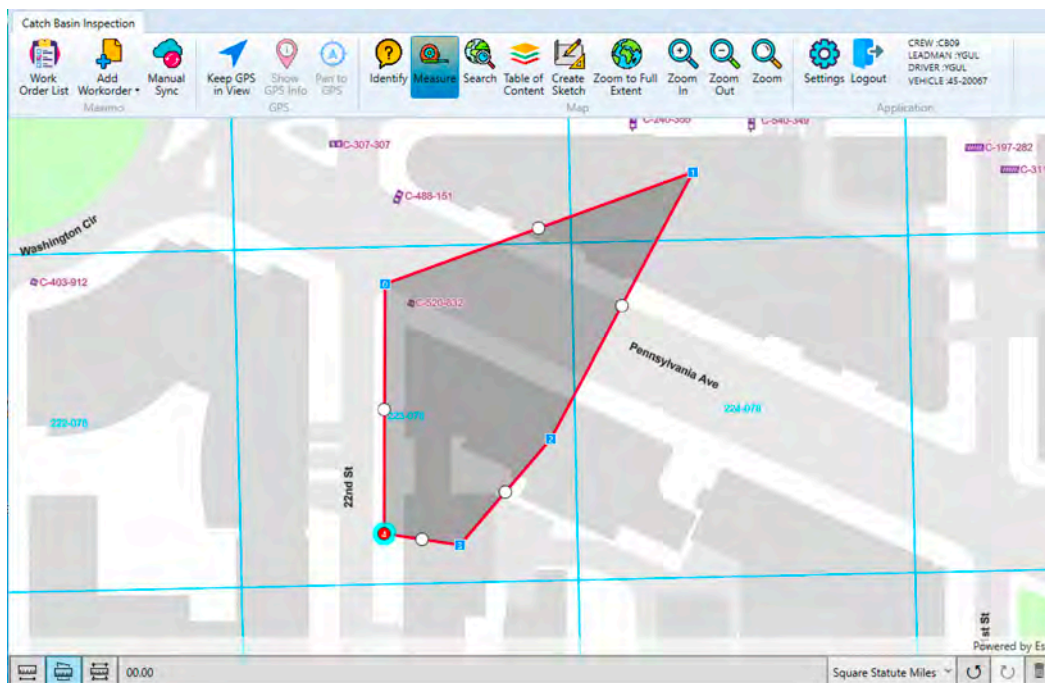


Figure 52 - Area measurement

10. Search:

Search functionality by attributes

11. Table of Content:

Pressing the **Table of Content** button will display the tree of layers on the map, which include but are not limited to Open Workorders, CNL/NoIDs, Assets, Sewer Network, Cleaning Zone, Base map. In this view the user can select or deselect the layers which

they want to see on the map. Refer to Figure 53 for Table of Content enablement of layers on map.

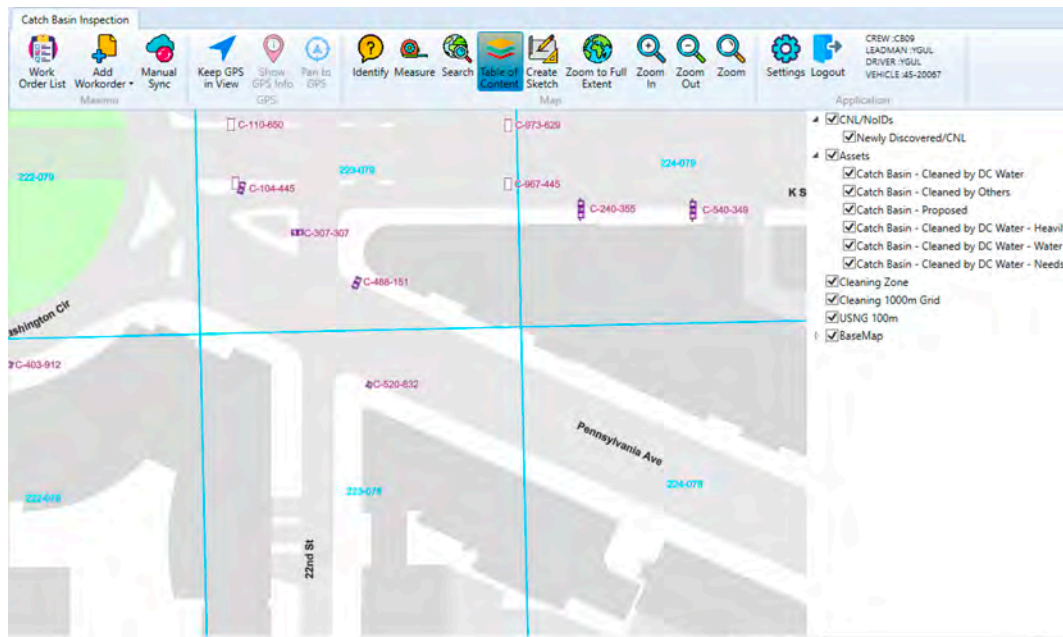


Figure 53 - Table of Content - Enablement of Layers on map

12. Zoom to Full Extent:

When pressed on Zoom to Full Extent, the who DC area map of service coverage will be shown (zoom-out all)

13. Zoom In/Out/Zoom:

Zoom functionality on the map. Selecting the zoom button and selecting a rectangular area will focus on this area. Or you can press the shift button and select the area on the map will zoom into selected area.

The third group is **Application operations** as shown in Figure 54:



Figure 54 - CB App ribbon menu bar (part-3) showing Settings - and detailed Crew Information for current login

The Application operations which can be selected are as follows (Settings & Logout):

14. Settings:

The logged in user can make changes for First/Second Man, Driver or Vehicle (shown in Figure 55. The current settings are also shown in the menu bar as seen in right part of Figure 54.



Figure 55 - Settings

15. Logout:

To log out from application.

APPENDIX-3: Starting & Stopping the Timer to Add Labor/Tool

In order to add Labor time of either Work or Travel type for a specifically assigned work order, the Green Timer button as shown in Figure 56.



Figure 56 – Green timer button

Once the Green Timer button is pressed, it will turn into a Red Timer button as shown in Figure 57 indicating that the timer is work.



Figure 57 – Red timer button

Note that, a crew member can start the timer, only if, there is no other timer of any work order started. The timer cannot be started if another work order's timer is already started. Until the other timer which has already started is stopped, no other work order's timer can be started.

Once the timer is stopped, the following Timer records will be created. For PM login type, 2 labor records and 1 tool time record will be created. For INV login type, 1 labor record and 1 tool time record will be created.

Each time the timer is started and stopped again; a new set of time records will be created.

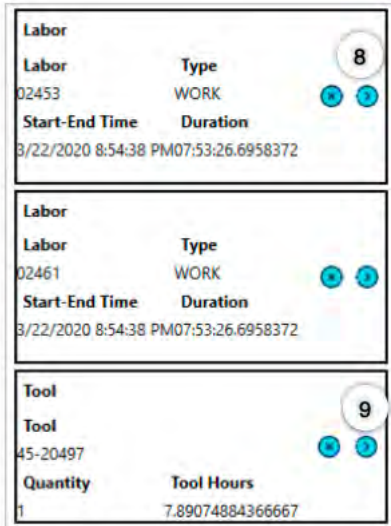
Actuals (Labor/Tools)			
Labor			
Labor	Type		
01290	WORK		
Start-End Time	Duration		
2/12/2020 12:07:22	PM00:00:27.0068242		
Labor			
Labor	Type		
03608	WORK		
Start-End Time	Duration		
2/12/2020 12:07:22	PM00:00:27.0068242		
Tool			
Tool			
45-20498			
Quantity	Tool Hours		
1	0.00750189561111111		

Figure 58 – Timer records for Labor and Tool time

APPENDIX-4: Editing Actuals

On all work orders, there will be an Actuals (Labor/Tools) Attribute that is used to manage/edit labor and tools transactions for that work order.

Once the labor and tool timer records are created, the records can be updated by pressing the blue right caret button (8)(9) of the respective time record to indicate whether the Labor time is Work or Travel type.



The Actuals dialog shows a list of transactions of Labor or Tool type. Depending on the origin for the display of the Actuals dialog, it will show different buttons at the bottom of the dialog box as shown below.

The dialog will show a list of Labor (8) and Tool (9) transactions.

The Labor record will show the Person ID (3), the Start Time (4), the total duration of time record (5), and the work type (6).

The Tool record will show the Tool ID, the quantity and the duration of the usage of this tool. Any record can be deleted by clicking the X button (7) or edited by clicking the caret button (8).

Once the blue caret button (8) is pressed the details of the timer record is shown in Figure 59.

Labor (1)			
Labor	Type	(7)	(8)
03608 (3)	WORK (6)	✕	➔
Start-End Time	Duration		
2/12/2020 12:07:22 PM (4)	00:00:27.0068242 (5)		

Tool (2)			
Tool		(9)	
45-20498		✕	➔
Quantity	Tool Hours		
1	0.007501895611111111		

The Person ID is translated to show the person’s full name (1), the start date (2) can be modified (refer to APPENDIX-6: Editing Date/Time Fields) along with the duration of this task (3) (refer to APPENDIX-5: Editing Duration Fields), the type of labor record (4) and finally the responsibility of this laborer (driver (6), Lead Man (7), Second Man (8)). The Work Type can be changed from Work to Travel or vice versa, the other fields can also be changed if necessary. After changes are made Save button (8) should be pressed. If changes are made, but the user decides not to change, the Cancel button (9) should be pressed.

The screenshot shows a window titled "Labor" with the following fields and controls:

- Labor** (1): A dropdown menu showing "Yavuz Gul".
- Start Date** (2): A date and time picker showing "Friday, February 14, 2020 10:57:25 AM".
- Duration** (3): A time picker showing "00:00:04".
- Type** (4): Radio buttons for "Work" (selected) and "Travel".
- Driver?** (5): A checked checkbox.
- Lead Man?** (6): A checked checkbox.
- Second Man?** (7): An unchecked checkbox.
- Buttons**: "Cancel" (9) and "Save" (8) buttons at the bottom.

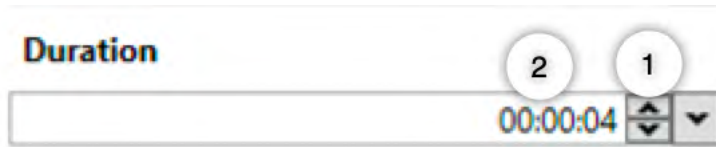
Figure 59 – Timer detail records for Labor time

The timer record for Tool (Figure 60) can also be updated for the Duration field (10) if necessary. After changes are made Save button (8) should be pressed. If changes are made, but the user decides not to change, the Cancel button (9) should be pressed.

Figure 60 – Timer detail records for Tool time

APPENDIX-5: Editing Duration Fields

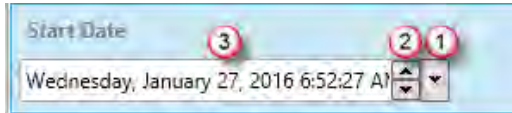
When the application required the entry of a Duration field it will present a widget should facilitate the data entry



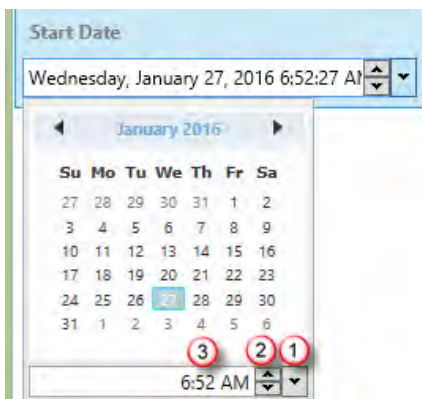
The user can modify the duration by using the up/down spinners (1) after having selected the portion he wants to change in the by clicking on it in the display window (2) or by directly typing in the value for that portion. Durations are in d.hh:mm:ss format although initially the day portion will not be shown (rare on an individual labor record).

APPENDIX-6: Editing Date/Time Fields

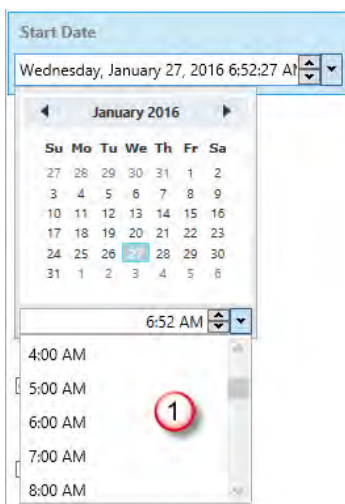
When the application required the entry of a Date/Time field it will present a widget should facilitate the data entry



The user can select to display a popup calendar by using the down arrow button on the right (1) or to use the up/down spinner buttons (2) after having selected the portion of the date time record he wants to modify in the display box (3) by clicking on that portion.



Using the popup calendar, the user can select the date by clicking on an entry on the calendar and can modify the time by using a drop down list (1) or the up/down spinners after having selected the portion he wants to change in the by clicking on it in the display window (3).

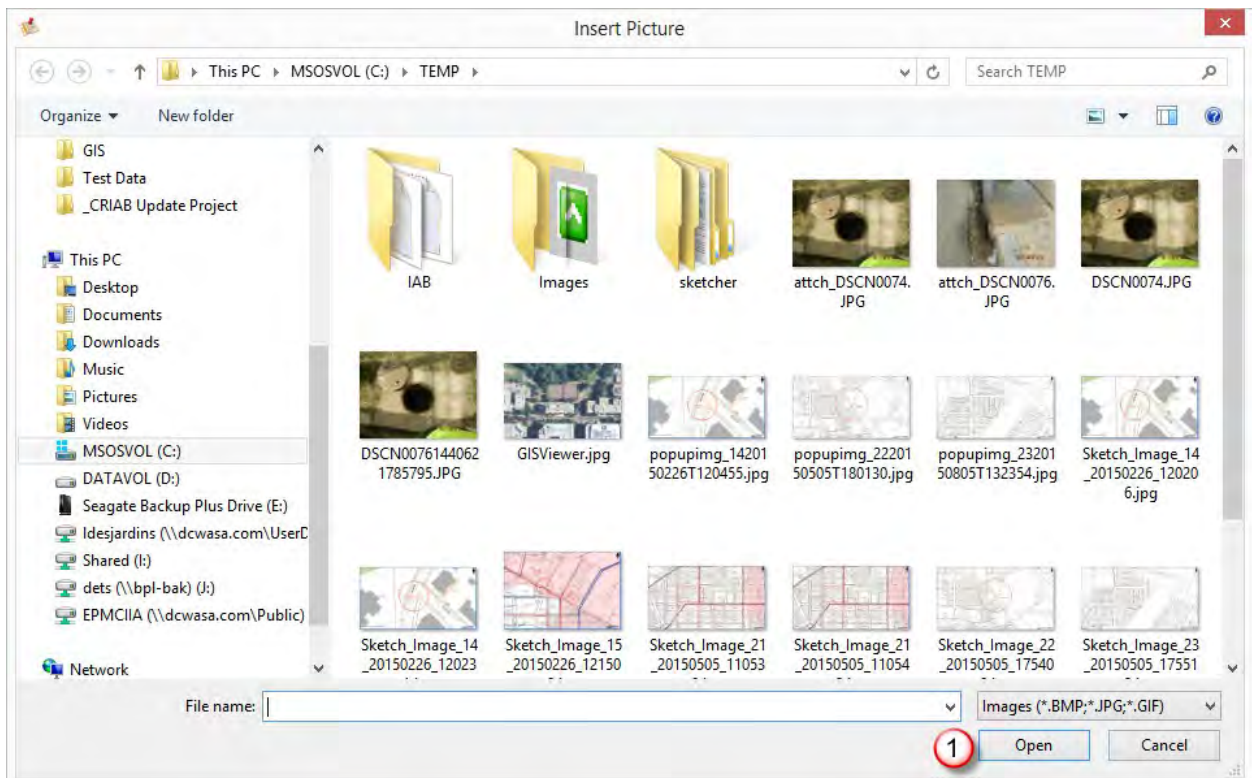


APPENDIX-7: Managing Attachments

Where configured, work orders will show the attachment attribute as shown below. It will allow the user to add an attachment. When adding a new attachment using the + button (1), the system will display a file dialog to allow the user to select the attachment document.



Clicking the open button (1) will create the attachment record.



Current detail attachments can be viewed from the Attachments.

APPENDIX-8: Editing Asset Attributes

When the user clicks on the edit caret on the Asset attribute on the work order, the application will display a list of attributes for that asset. The user will have the ability to enter/update these attributes. Depending on the attribute type, the user will have the option to pick a value from a large list of values (1), check a check box (2), select from a short list of values (3), enter a numeric value (4) or a text string (5).

The screenshot shows a form titled "Asset Tag" for asset ID "C-310-039-520-670". The form contains several fields and sections:

- Type**: A dropdown menu with "ELONGATE" selected. Callout 1 is next to the label.
- Top Material**: A dropdown menu with "Concrete" selected. Callout 3 is next to the label.
- Top Thickness**: A dropdown menu with "4'" selected.
- Grate Type**: A dropdown menu.
- Number of Chambers**: A text input field with "1" entered. Callout 4 is next to the label.
- Number of Throats**: A text input field with "2" entered.
- Location Detail**: A text input field. Callout 5 is next to the label.
- Owner**: A dropdown menu with "DC WASA" selected.
- Cleaning Responsibility**: A dropdown menu with "DC WASA" selected.
- Is Water Quality?**: A checkbox, currently unchecked. Callout 2 is next to the label.
- Is In MS4?**: A checked checkbox.
- Is Corner CB?**: A checkbox, currently unchecked.
- Has Biofilter?**: A checkbox, currently unchecked.
- Flow Restrictor Type**: A dropdown menu.
- Has Sump?**: A checkbox, currently unchecked.
- Has Water Seal?**: A checkbox, currently unchecked.

At the bottom of the form are two buttons: "Cancel" (callout 7) and "Save" (callout 6).

The user can then save his changes by clicking on the Save button (6) or discard them by clicking on the Cancel button (7).

Appendix 3

DC Water Catch Basin Cleaning Database – Key to Codes

Prepared by Matt English (DOEE)

Below is a key to some of the codes found in data from the raw data exports from the DC Water Catch Basin Cleaning Mobile App:

- ASSETATTR - Asset Attribute – This data column holds a long description of data to be collected in the AssetAttrID column. An example would be “Catch Basin Status (Before Cleaning)”
- ASSETATTRID – This data column holds the code for the unit of measurement metric of the data collected in the AlnValue column. Examples for Cleaning activities below:
 - o CBBCSTATUS – Catch Basin Before Cleaning Status
 - o CBACSTATUS – Catch Basin After Cleaning Status
- ALNVALUE – This data column holds the actual value of the measurement described in the AssetAttrID column. For catch basin cleaning data, values are the estimated percent of catch basin that is filled with debris.
- ACTIVITY FINISH DATE – Date of work completion
- SUBTYPE - Catch Basin Type (single/double/triple/etc.)