

LOCAL STREETS WITHOUT CURB

NOTES

1. Item numbers refer to the Ohio Department of Highways construction and material specifications, and all construction work shall be done according to said specifications or Butler County requirements and standards for subdivisions. When in conflict, the County requirements shall prevail.
2. Items that pertain to underground utilities such as watermain pipe, sanitary sewer pipe, water valves and manhole frames and covers, etc., will remain under specifications of the utility serving the area. Storm sewers shall be designed and constructed in accordance with the requirements of the Butler County Engineer.
3. All trenches within the right of way and 10' utility easements shall be compacted and backfilled in accordance with Items 203 and 603 in the state specifications.
4. Surface course (item 448) and tack coat (item 407) are to be applied no sooner than twelve (12) months after the leveling course (item 448), and fifty (50) percent of the homes are completed. If after two (2) years, fifty (50) percent of the homes have not been completed, then the top course may be applied.
5. A minimum 10' utility easement shall be shown on the record plat parallel and immediately adjacent to the right of way line allowing for installation, operation and maintenance of sewers, water, electric and telephone conduit and any other public or quasi public utility.
6. Developer shall be responsible for the installation of conduits for the full width of the public right of way at a depth of 38" for use by the electric, telephone and cable TV services. The location of these lines shall be coordinated with utility companies by the developer.
7. Sanitary laterals shall be extended beyond the limits of the utility easements, but not to exceed 12' from the right of way line.
8. All electrical transformers shall be located so that they do not interfere with the existing manholes.

LEGEND

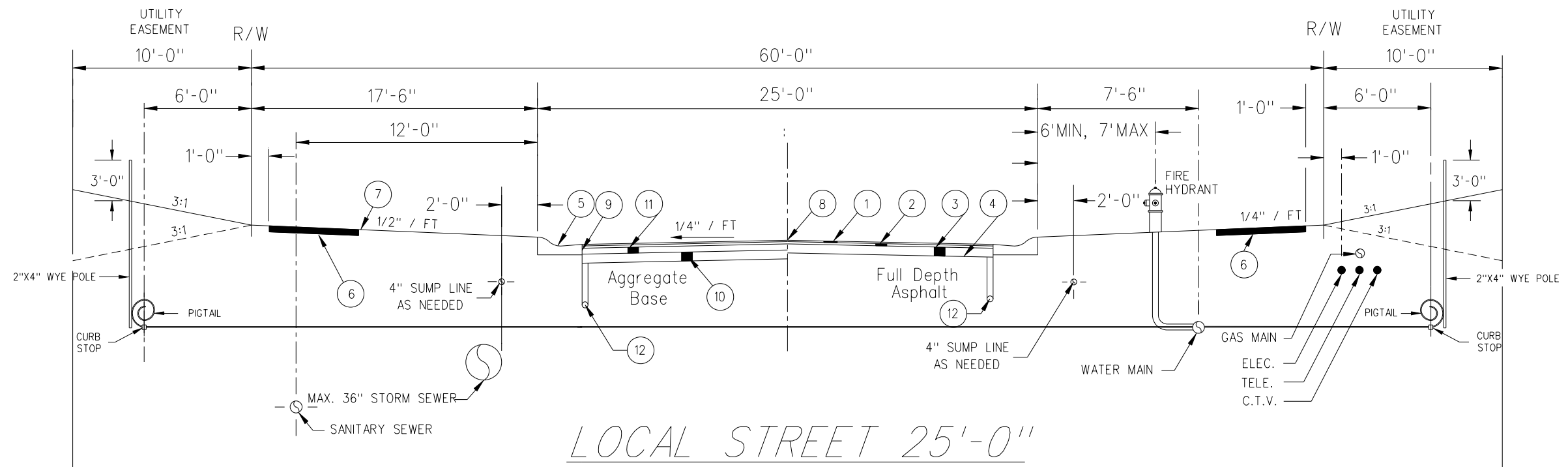
- ① 1 inch surface course item 448 asphalt concrete, see note #4.
- ② 1 1/2 inch leveling course 403 asphalt concrete (85-100 or AC-20).
- ③ Six inch base course of item 301 bituminous aggregate base.
- ④ Compacted subgrade, item 203.13.
- ⑤ Seeding and mulching item 659.
- ⑥ Sodding 9 feet wide item 660.
- ⑦ Guard rail item 606.
- ⑧ Tack coat, item 407 to be applied at a rate of 0.05 gal. per sq. yd. see note #4.
- ⑨ 4 inch base course of item 301 bituminous aggregate base.
- ⑩ 6 inch base course of item 304 aggregate base.
- ⑪ Berm 1/2 inch below pavement edge.

ITEM	DEPTH TOP OF PIPE
Sumplines	24" - 30"
Gas	24" - 30"
Water	48" - 54"
Electric	36" - 40"
Telephone	36" - 40"
Cable TV	36" - 40"

REVISIONS	DATE	C-1
BERM	07-09-94	TYPICAL CROSS SECTION OF LOCAL STREET WITHOUT CURB
STONE BASE	09-09-11	

CHK. BY: EJP EFFECTIVE DATE: 01-01-12

BUTLER COUNTY ENGINEERS OFFICE
AND OPERATIONS FACILITY
1921 FAIRGROVE AVENUE - HAMILTON, OHIO
PHONE 867-5744 45011



LOCAL STREET 25'-0"

NOTES

1. Item numbers refer to the Ohio Department of Highways construction and material specifications, and all construction work shall be done according to said specifications or Butler County requirements and standards for subdivisions. When in conflict, the County requirements shall prevail.
2. Items that pertain to underground utilities such as watermain pipe, sanitary sewer pipe, water valves and manhole frames and covers, etc., will remain under specifications of the utility serving the area. Storm sewers shall be designed and constructed in accordance with the requirements of the Butler County Engineer.
3. All trenches within the right of way and 10' utility easements shall be compacted and backfilled in accordance with Items 203 and 603 in the state specifications.
4. Surface course (Item 448) and tack coat (Item 407) are to be applied no sooner than twelve (12) months after the leveling course (Item 448), and fifty (50) percent of the homes are completed. If after two (2) years, fifty (50) percent of the homes have not been completed, then the top course may be applied.
5. A minimum 10' utility easement shall be shown on the record plat parallel and immediately adjacent to the right of way line allowing for installation, operation and maintenance of sewers, water, electric and telephone conduit and any other public or quasi public utility.
6. Developer shall be responsible for the installation of conduits for the full width of the public right of way at a depth of 38" for use by the electric, telephone and cable TV services. The location of these lines shall be coordinated with utility companies by the developer.
7. Sanitary laterals shall be extended beyond the limits of the utility easements, but not to exceed 12' from the right of way line.
8. All electrical transformers shall be located so that they do not interfere with the existing manholes.
9. Sump line conduits are to be SDR 35.
10. The sanitary sewer shall be placed in such a manner that the sanitary manhole cover does not conflict with the sidewalk.

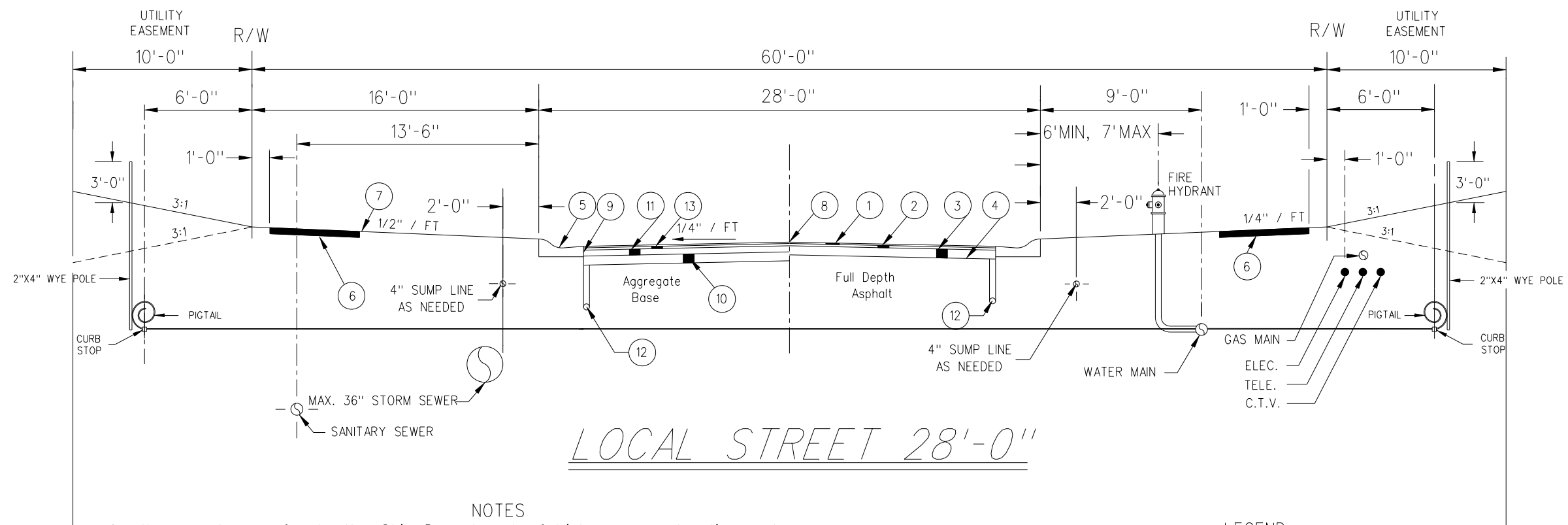
LEGEND

- ① One inch surface course of Item 448 asphaltic concrete, see note #4.
- ② One and one half inch leveling course of Item 448 asphaltic concrete
- ③ Six inch base course of Item 301 bituminous aggregate base.
- ④ Compacted subgrade, Item 203.13.
- ⑤ Roll type curb and gutter, Item 609 (Butler County Standard C-1).
- ⑥ Four inch thick class "C" concrete sidewalk, five feet wide, Item 608. Walk to be 1/2" higher than sod .
- ⑦ Seeding and mulching item 659.
- ⑧ Tack coat, item 407 - to be applied at a rate of 0.05 gal. per sq. yard, see note #4.
- ⑨ Tack coat shall be applied to front face of curb prior to the installation of 301 bituminous aggregate base. Also to be applied to curb joint after the installation of 448 leveling course.
- ⑩ Six inch base course of Item 304 aggregate base.
- ⑪ Four inch base course of Item 301 bituminous aggregate base.
- ⑫ Item 605, 4" underdrain.

ITEM	DEPTH TOP OF PIPE
Underdrain	18"
Sump lines	24" - 30"
Gas	24" - 30"
Water	48" - 54"
Electric	36" - 40"
Telephone	36" - 40"
Cable TV	36" - 40"

REVISIONS	DATE
Added 5' Sidewalk	2007
25' Width	2011
Revised dimensions	4/2011

C-2A
TYPICAL CROSS SECTION OF
25' LOCAL STREET WITH CURB
CHK. BY: EJP EFFECTIVE DATE: 01-01-11
BUTLER COUNTY ENGINEERS OFFICE
AND OPERATIONS FACILITY
1921 FAIRGROVE AVENUE - HAMILTON, OHIO
PHONE 867-5744 45011



LOCAL STREET 28'-0"

NOTES

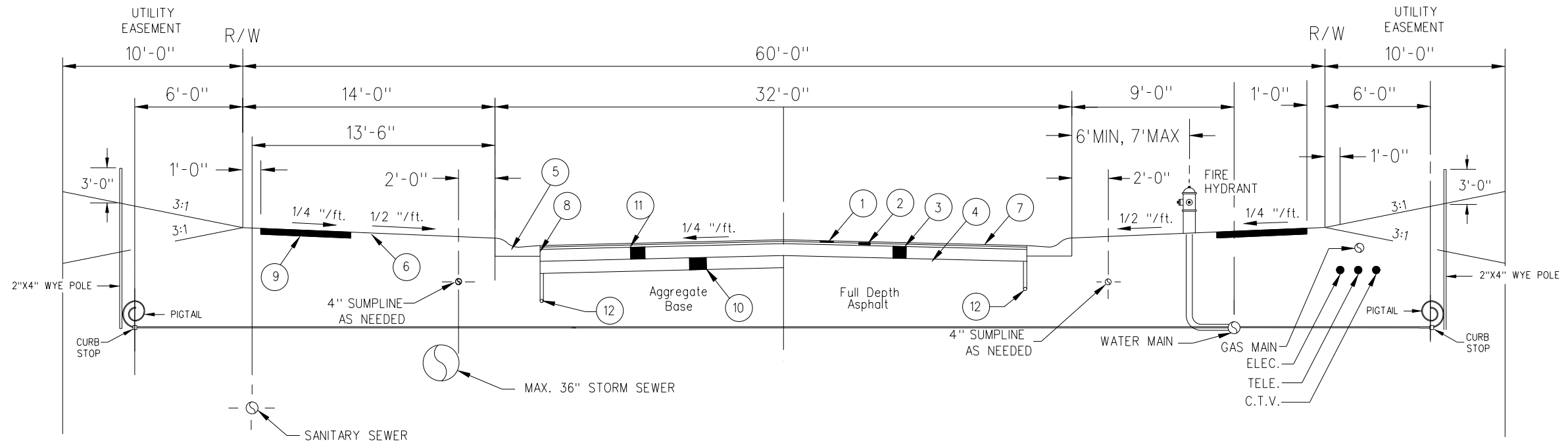
1. Item numbers refer to the Ohio Department of Highways construction and material specifications, and all construction work shall be done according to said specifications or Butler County requirements and standards for subdivisions. When in conflict, the County requirements shall prevail.
2. Items that pertain to underground utilities such as watermain pipe, sanitary sewer pipe, water valves and manhole frames and covers, etc., will remain under specifications of the utility serving the area. Storm sewers shall be designed and constructed in accordance with the requirements of the Butler County Engineer.
3. All trenches within the right of way and 10' utility easements shall be compacted and backfilled in accordance with Items 203 and 603 in the state specifications.
4. Surface course (Item 448) and tack coat (Item 407) are to be applied no sooner than twelve (12) months after the leveling course (Item 448), and fifty (50) percent of the homes are completed. If after two (2) years, fifty (50) percent of the homes have not been completed, then the top course may be applied.
5. A minimum 10' utility easement shall be shown on the record plat parallel and immediately adjacent to the right of way line allowing for installation, operation and maintenance of sewers, water, electric and telephone conduit and any other public or quasi public utility.
6. Developer shall be responsible for the installation of conduits for the full width of the public right of way at a depth of 38" for use by the electric, telephone and cable TV services. The location of these lines shall be coordinated with utility companies by the developer.
7. Sanitary laterals shall be extended beyond the limits of the utility easements, but not to exceed 12' from the right of way line.
8. All electrical transformers shall be located so that they do not interfere with the existing manholes.
9. Sump line conduits are to be SDR 35.
10. The sanitary sewer shall be placed in such a manner that the sanitary manhole cover does not conflict with the sidewalk.

LEGEND

- ① One inch surface course of Item 448 asphaltic concrete, see note #4.
- ② Two and one half inch leveling course of Item 448 asphaltic concrete
- ③ Six inch base course of Item 301 bituminous aggregate base.
- ④ Compacted subgrade, Item 203.13.
- ⑤ Roll type curb and gutter, Item 609 (Butler County Standard C-1).
- ⑥ Four inch thick class "C" concrete sidewalk, five feet wide, Item 608. Walk to be 1/2" higher than sod .
- ⑦ Seeding and mulching item 659.
- ⑧ Tack coat, Item 407 - to be applied at a rate of 0.05 gal. per sq. yard, see note #4.
- ⑨ Tack coat shall be applied to front face of curb prior to the installation of 301 bituminous aggregate base. Also to be applied to curb joint after the installation of 448 leveling course.
- ⑩ Six inch base course of Item 304 aggregate base.
- ⑪ Five inch base course of Item 301 bituminous aggregate base.
- ⑫ Item 605, 4" underdrain. Connect underdrain to front face of nearest catch basin.
- ⑬ One and one half inch leveling course of Item 448 asphaltic concrete.

ITEM	DEPTH TOP OF PIPE
Underdrain	18"
Sump lines	24" - 30"
Gas	24" - 30"
Water	48" - 54"
Electric	36" - 40"
Telephone	36" - 40"
Cable TV	36" - 40"

DATE	C-2B
Added 5' Sidewalk Section	2007
	2011
TYPICAL CROSS SECTION OF 28' LOCAL STREET WITH CURB	
CHK. BY: EJP	EFFECTIVE DATE: 01-01-11
BUTLER COUNTY ENGINEERS OFFICE AND OPERATIONS FACILITY 1921 FAIRGROVE AVENUE - HAMILTON, OHIO PHONE 867-5744 45011	



LOCAL INDUSTRIAL STREET

NOTES

1. Item numbers refer to the Ohio Department of Highways construction and material specifications, and all construction work shall be done according to said specifications or Butler County requirements and standards for subdivisions. When in conflict, the County requirements shall prevail.
2. Items that pertain to underground utilities such as watermain pipe, sanitary sewer pipe, water valves and manhole frames and covers, etc., will remain under specifications of the utility serving the area. Storm sewers shall be designed and constructed in accordance with the requirements of the Butler County Engineer.
3. All trenches within the right of way and 10' utility easements shall be compacted and backfilled in accordance with Items 203 and 603 in the state specifications.
4. Surface course (Item 448) and tack coat (Item 407) are to be applied no sooner than twelve (12) months after the leveling course (Item 448).
5. A minimum 10' utility easement shall be shown on the record plat parallel and immediately adjacent to the right of way line allowing for installation, operation and maintenance of sewers, water, electric and telephone conduit and any other public or quasi public utility.
6. Developer shall be responsible for the installation of conduits for the full width of the public right of way at a depth of 38" for use by the electric, telephone and cable TV services. The location of these lines shall be coordinated with utility companies by the developer.
7. Sanitary laterals shall be extended beyond the limits of the utility easements, but not to exceed 12' from the right of way line.
8. All electrical transformers shall be located so that they do not interfere with the existing manholes.
9. 4" Underdrain may be required by Butler County Engineer depending on soil condition.
10. Sump lines conduits are to be SDR 35.

LEGEND

- ① One inch surface course of Item 448 asphaltic concrete, see note #4.
- ② Two inches leveling course of Item 448 asphaltic concrete
- ③ Eight inch base course of Item 301 bituminous aggregate base.
- ④ Compacted subgrade, Item 203.13.
- ⑤ Roll type curb and gutter, Item 609 (Butler County Standard C-1).
- ⑥ Seeding and mulching Item 659.
- ⑦ Tack coat, Item 407 - to be applied at a rate of 0.05 gal. per sq. yard, see note #4.
- ⑧ Tack coat shall be applied to front face of curb prior to the installation of 301 bituminous aggregate base. Also to be applied to curb joint after the installation of 403 leveling course.
- ⑨ Four inch thick class "C" concrete sidewalk, five feet wide, Item 608. Walk to be 1/2" higher than sod.
- ⑩ Six inch base course of Item 304 aggregate base.
- ⑪ Six inch base course of Item 301 bituminous aggregate base.
- ⑫ Item 605, 4" underdrain. Connect underdrain to front face of nearest catch basin.

ITEM	DEPTH TOP OF PIPE
Sumplines	24" - 30"
Gas	24" - 30"
Water	48" - 54"
Electric	36" - 40"
Telephone	36" - 40"
Cable TV	36" - 40"

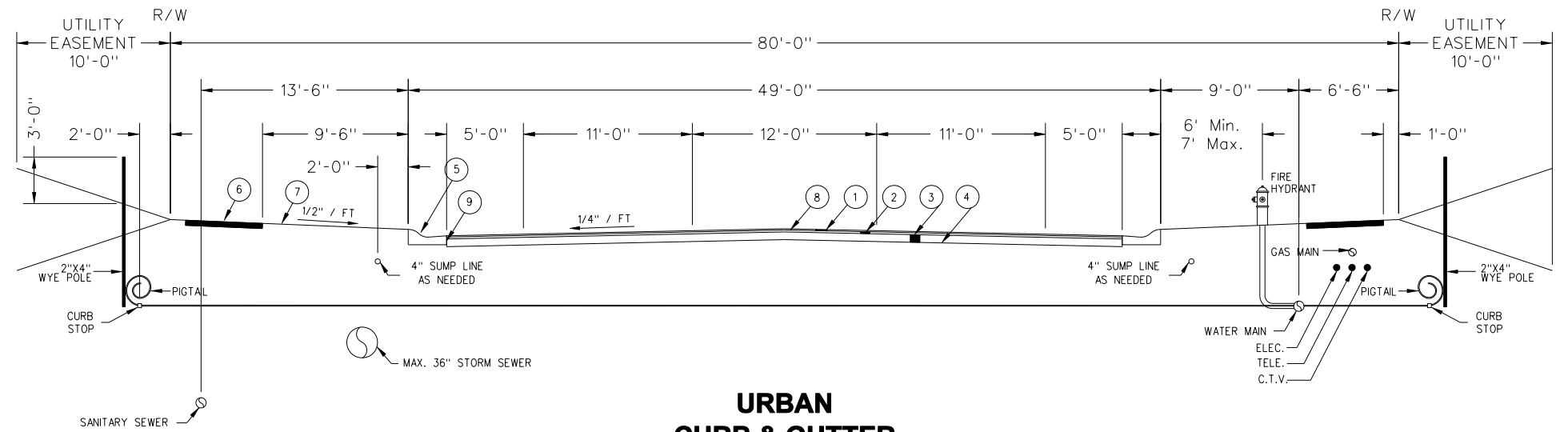
REVISIONS	DATE	C-3
SIDEWALK	7-97	TYPICAL CROSS SECTION OF LOCAL INDUSTRIAL STREET
Added 5' Sidewalk	2007	
Section	2011	

CHK. BY: EJP EFFECTIVE DATE: 01-01-11

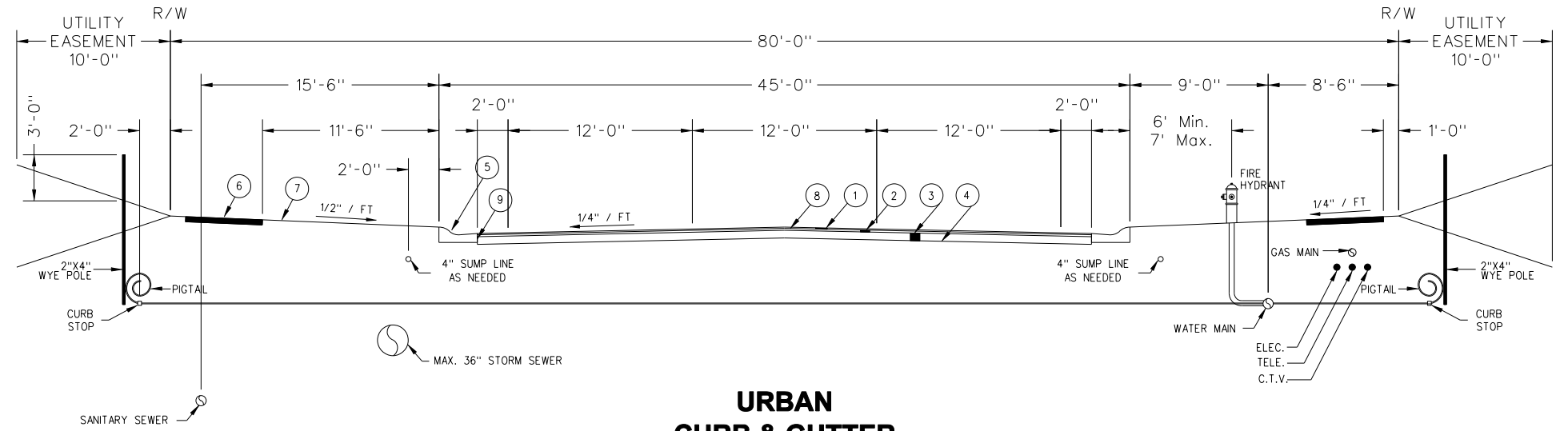
BUTLER COUNTY ENGINEERS OFFICE
AND OPERATIONS FACILITY
1921 FAIRGROVE AVENUE - HAMILTON, OHIO
PHONE 867-5744 45011

NOTES

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- All trenches within the right of way and 10' utility easements shall be compacted and backfilled in accordance with Items 203 and 603 in the state specifications.
- Surface course (item 404) and tack coat (item 407) are to be applied no sooner than nine (9) months after the leveling course (item 403), and fifty (50) percent of the homes are completed. If after two (2) years, fifty (50) percent of the homes have not been completed, then the top course may be applied.
- A minimum 10' utility easement shall be shown on the record plat parallel and immediately adjacent to the right of way line allowing for installation, operation and maintenance of sewers, water, electric and telephone conduit and any other public or quasi public utility.
- Developer shall be responsible for the installation of conduits for the full width of the public right of way at a depth of 36" for use by the electric, telephone and cable TV services. The location of these lines shall be coordinated with utility companies by the developer.
- Sanitary laterals shall be extended beyond the limits of the utility easements, but not to exceed 12' from the right of way line.
- All electrical transformers shall be located so that they do not interfere with the existing manholes.
- Sump line conduits are to be SDR 35, Armo 2000, or of equivalence.
- The sanitary sewer shall be placed in such a manner that the sanitary manhole cover does not conflict with the sidewalk.



**URBAN
CURB & GUTTER
BIKE FACILITY**



**URBAN
CURB & GUTTER
WITHOUT BIKE FACILITY**

LEGEND

- One inch surface course of item 448 asphaltic concrete, see note *4.
- Two and one half inch leveling course of item 448 asphaltic concrete
- Six inch base course of item 301 bituminous aggregate base.
- Compacted subgrade, item 203.13.
- Roll type curb and gutter, item 609 (Butler County Standard C-1).
- Four inch thick class "C" concrete sidewalk, five feet wide, item 608. Walk to be 1/2" higher than sod.
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- Tack coat, item 407 - to be applied at a rate of 0.05 gal. per sq. yard, see note *4.
- Tack coat shall be applied to front face of curb prior to the installation of 301 bituminous aggregate base. Also to be applied to curb joint after the installation of 448 leveling course.

ITEM	DEPTH TOP OF PIPE
SUMLINES	24" - 30"
GAS	24" - 30"
WATER	48" - 54"
ELECTRIC	36" - 40"
TELEPHONE	36" - 40"
CABLE TV	36" - 40"

REVISIONS	DATE
Entire Dwg	2007

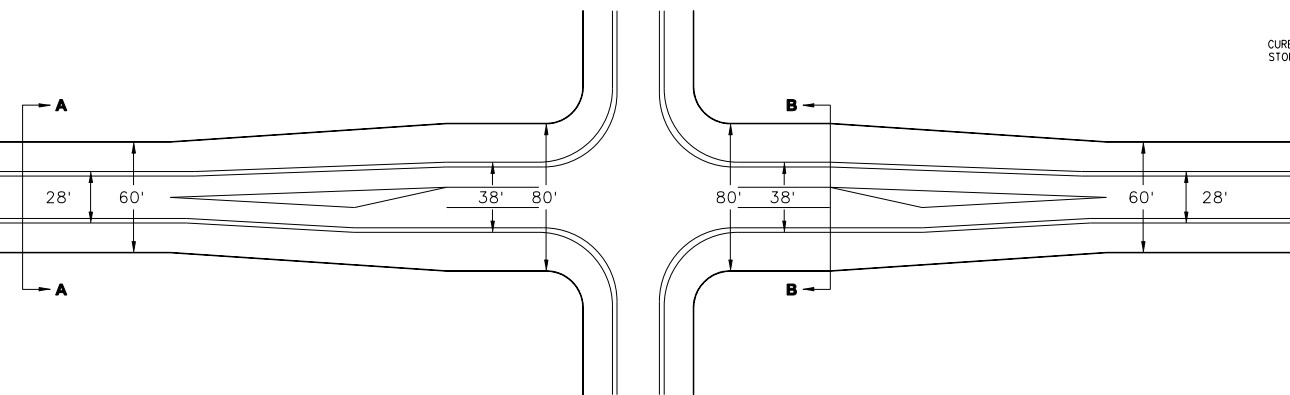
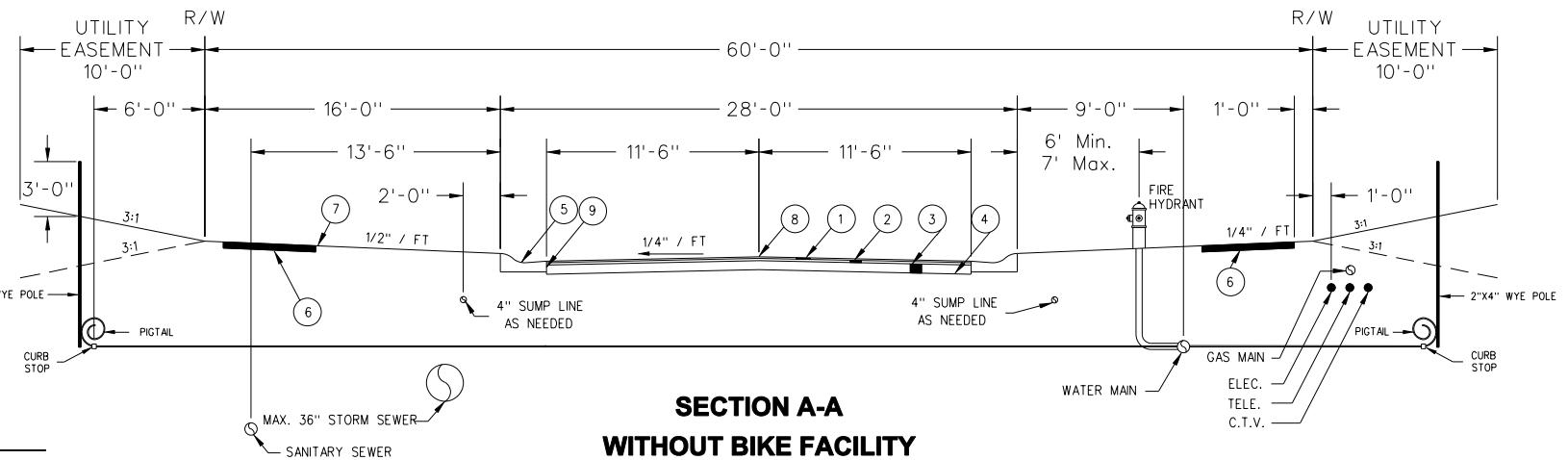
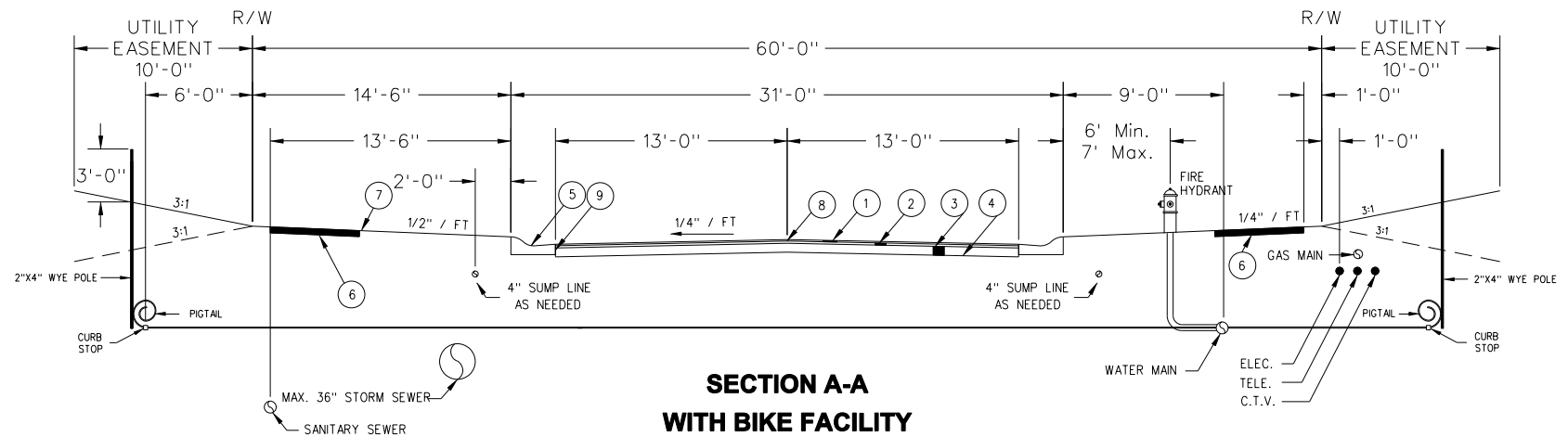
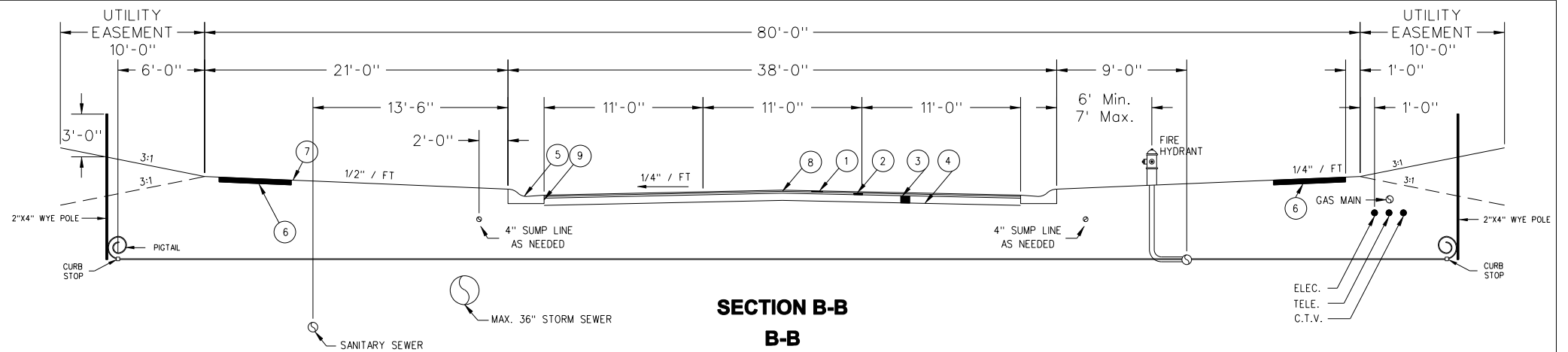
C-4
TYPICAL CROSS SECTION OF
MINOR COLLECTOR STREET
CHK. BY: E.J.P. EFFECTIVE DATE: 01-01-2008
BUTLER COUNTY ENGINEERS OFFICE
AND OPERATIONS FACILITY
1921 FAIRGROVE AVENUE - HAMILTON, OHIO
PHONE 867-5744 45011

SERVICES

ITEM	DEPTH TOP OF PIPE
SUMPLINES	24" - 30"
GAS	24" - 30"
WATER	48" - 54"
ELECTRIC	36" - 40"
TELEPHONE	36" - 40"
CABLE TV	36" - 40"

NOTES

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- Sanitary laterals shall be extended beyond the limits of the utility easements, but not to exceed 12' from the right of way line.
- All electrical transformers shall be located so that they do not interfere with the existing manholes.
- Sump line conduits are to be SDR 35.
- The sanitary sewer shall be placed in such a manner that the sanitary manhole cover does not conflict with the sidewalk.



PLAN VIEW

LEGEND

- One inch surface course of item 448 asphaltic concrete, see note #4.
- Two and one half inch leveling course of item 448 asphaltic concrete.
- Six inch base course of item 301 bituminous aggregate base.
- Compacted subgrade, item 203.13.
- Roll type curb and gutter, item 609 (Butler County Standard C-1).
- Four inch thick class "C" concrete sidewalk, five feet wide, item 608. Walk to be 1/2" higher than sod.
- Seeding and mulching item 659.
- Tack coat, item 407 - to be applied at a rate of 0.05 gal. per sq. yard, see note #4.
- Tack coat shall be applied to front face of curb prior to the installation of 301 bituminous aggregate base. Also to be applied to curb joint after the installation of 448 leveling course.

REVISIONS	DATE	C-5
Entire Dwg	2007	

TYPICAL CROSS SECTION OF
MINOR COLLECTOR STREET
SECOND CLASS

CHK. BY: E.J.P. EFFECTIVE DATE: 01-01-2008

BUTLER COUNTY ENGINEERS OFFICE
AND OPERATIONS FACILITY
1921 FAIRGROVE AVENUE - HAMILTON, OHIO
PHONE 867-5744 45011

NOTES

GRATES:
STANDARD GRATE AS SHOWN IN THE PLAN VIEW SHALL BE PROVIDED UNLESS THE PLANS SPECIFICALLY REQUIRE GRATE "V". PLACE GRATE SO THE DIAGONAL BARS DIRECT DRAINAGE FLOW TOWARD THE CURB. ALL BAR EDGES TO BE ROUNDED 1/8" RADIUS.

CASTINGS:
THE DESIGN SHALL BE ESSENTIALLY THE SAME AND EQUALLY AS STRONG AS THOSE SHOWN HERON. MINIMUM WEIGHTS ARE: CURB CASTING 305 LBS., TWO GRATES 254LBS., FRAME 590 LBS., AND TWO "V" GRATES 210 LBS. BEARING AREAS OF FRAME AND GRATE SHALL BE SO FITTED AND FINISHED, WITHOUT PROJECTIONS, AS TO PROVIDE A FIRM AND EVEN SEAT FOR ALL PORTIONS OF THE GRATE IN THE FRAME WITHOUT ROCKING.

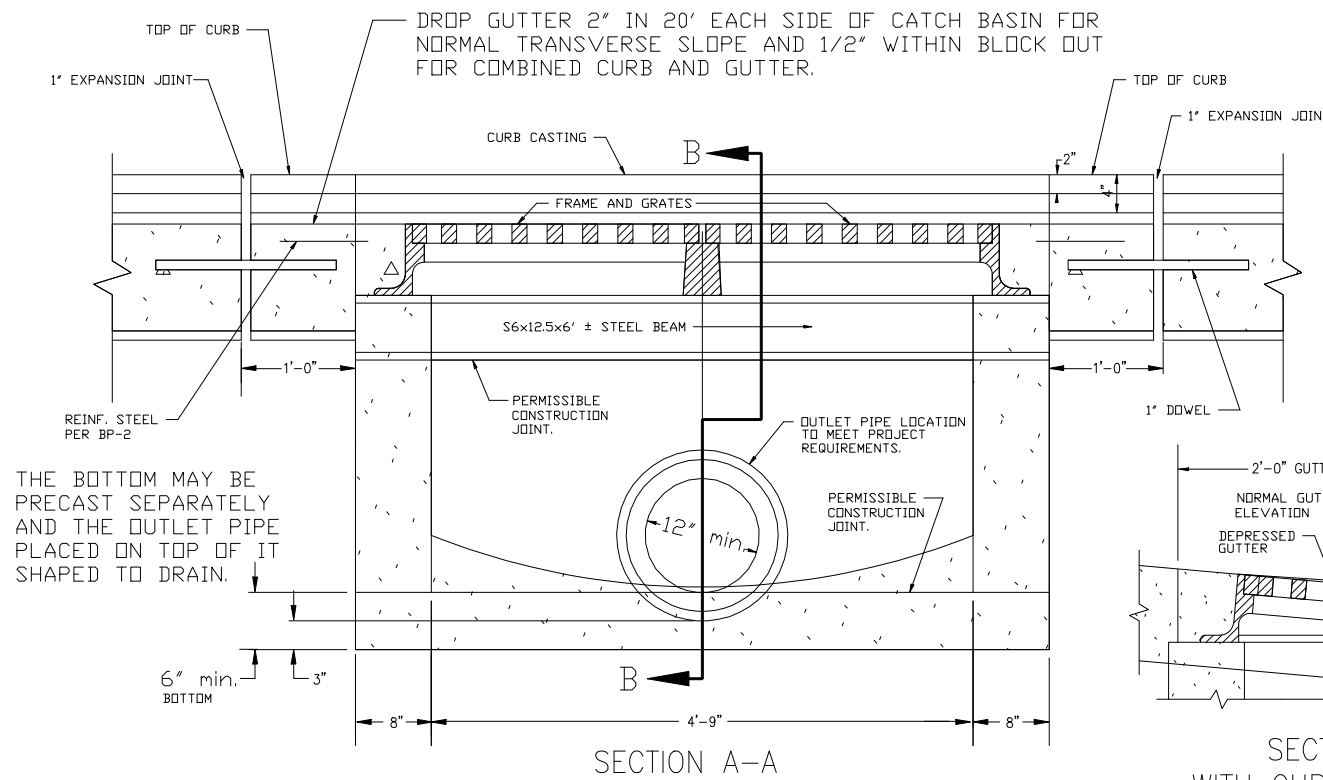
DOWELS: FOUR 1" x 18" ARE REQUIRED FOR CONCRETE PAVEMENT OF GUTTER BLOCKOUT. SEE ODOT BP-4 FOR DOWEL DETAILS.

BRICK OR CONCRETE BLOCK: SIDE WALLS WHEN USED IN PLACE OF CONCRETE, SHALL BE 8" NOMINAL THICKNESS.

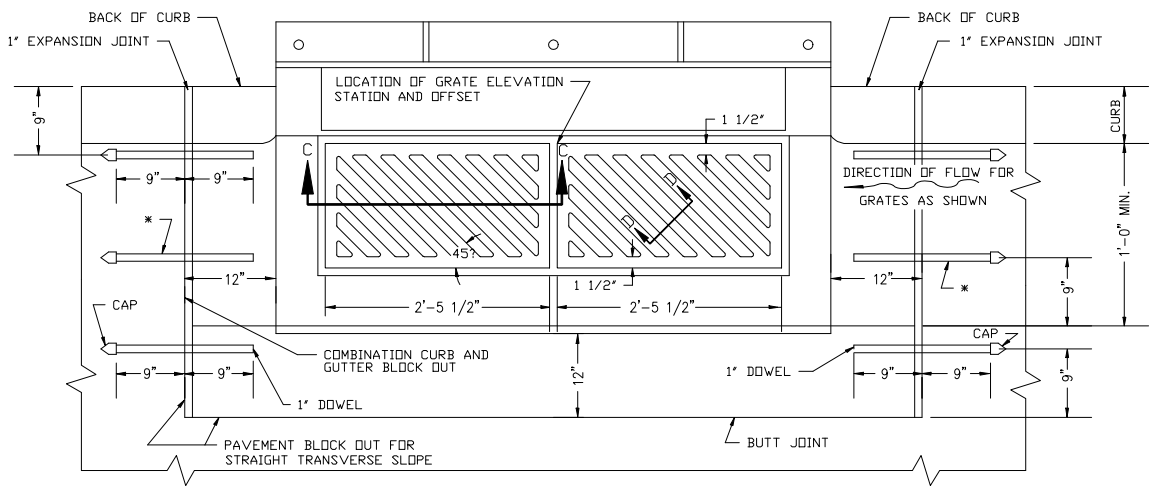
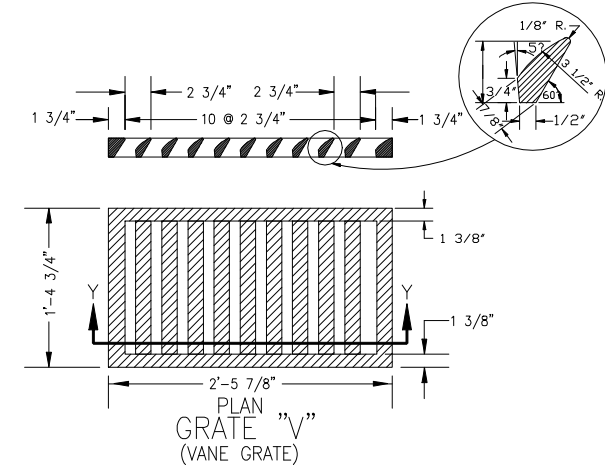
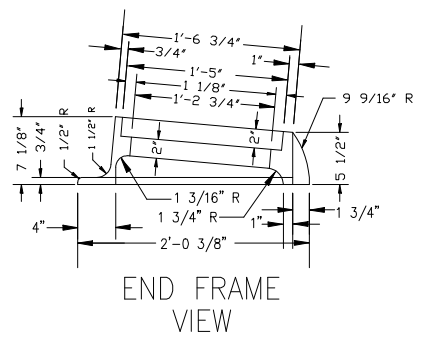
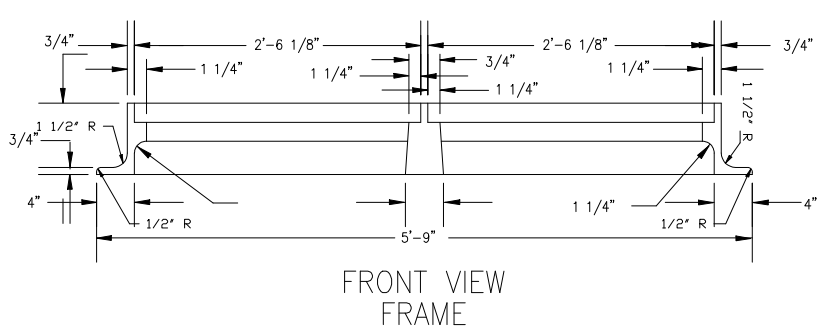
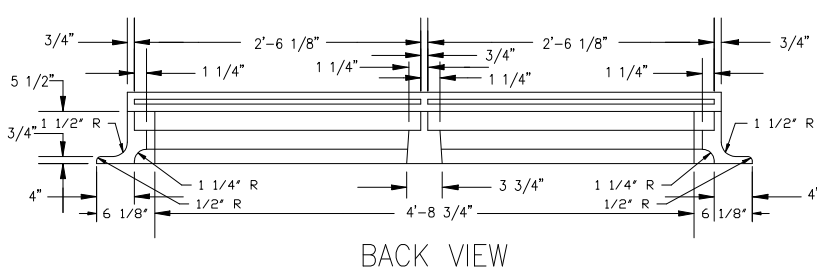
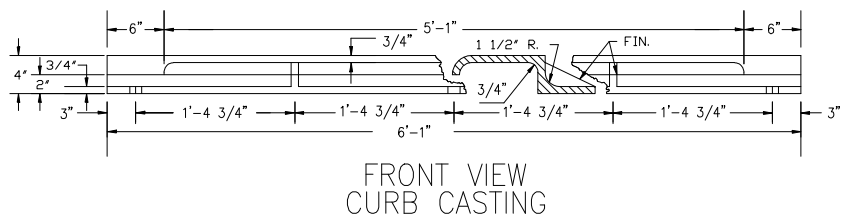
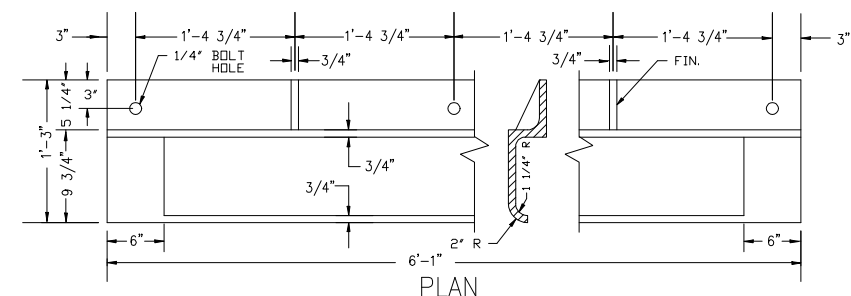
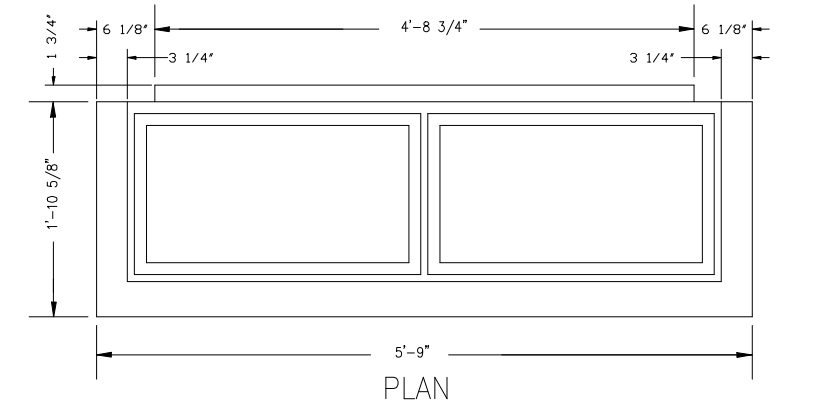
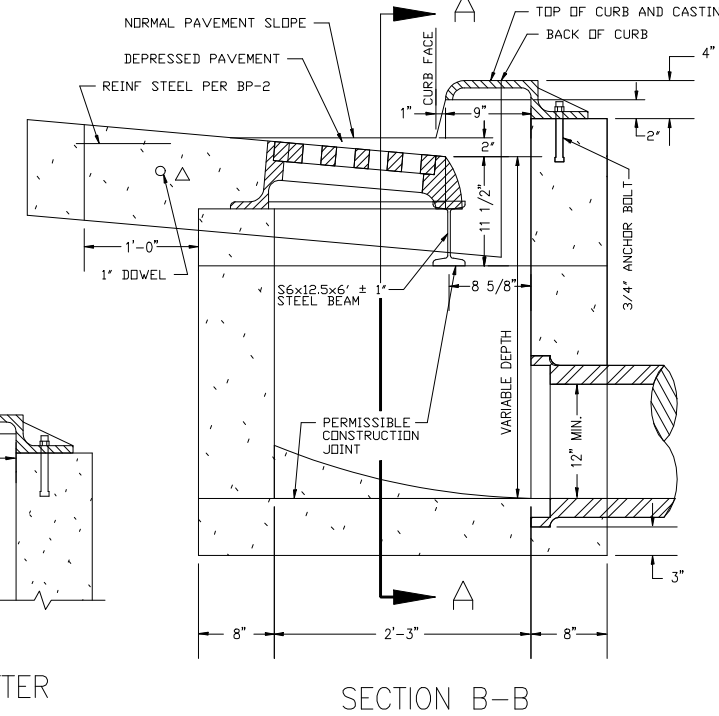
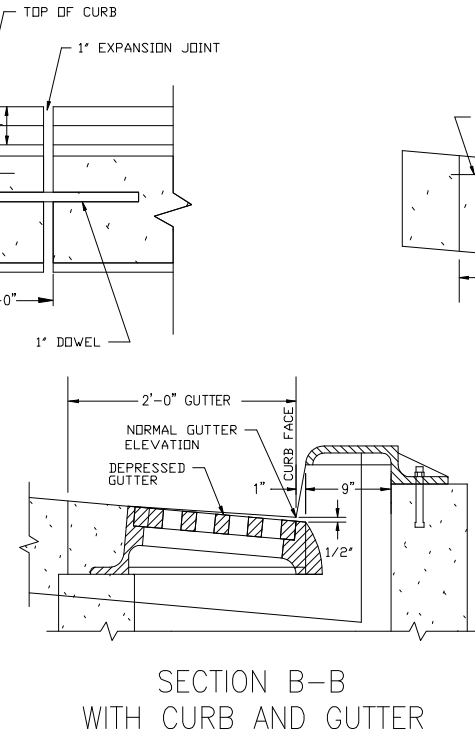
BLOCKOUT: SHALL BE PAVED WITH CLASS C CONCRETE IN PCC PAVEMENT OR GUTTER AND PAID FOR AS PART OF THE PAVEMENT OR GUTTER WITH NO DEDUCTION IN PAVEMENT, CURB OR GUTTER QUANTITIES BECAUSE OF CASTINGS. A CLASS C CONCRETE APRON THE SIZE OF THE 2' GUTTER BLOCKOUT SHALL BE CAST IN PLACE IN ASPHALT PAVEMENT (NO DOWELS REQUIRED) WITH THE COST INCLUDED IN THE CATCH BASIN BID PRICE. NO DEDUCTIN TO BE MADE IN CURB QUANTITIES.

PRECAST: CONSTRUCTION IS PERMITTED, EXCEPT FOR APRON, AND CONCRETE SHALL MEET REQUIREMENTS OF 706.13 WITH 6± 2% AIR VOID CONTENT IN THE HARDENED CONCRETE. PRECAST WALLS SHALL HAVE A MINIMUM THICKNESS OF 6" AND REINFORCING SHALL BE SUFFICIENT TO PERMIT SHIPPING AND PLACEMENT WITHOUT DAMAGE.

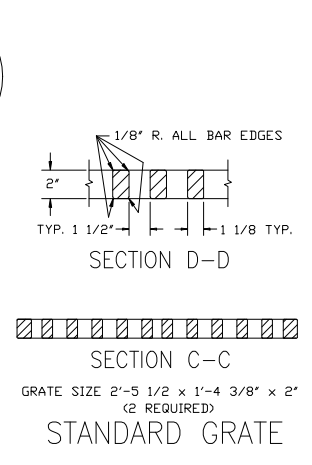
STEPS: STEPS SHALL BE PROVIDED WHERE THE DEPTH EXCEEDS 48" AND SHALL MEET THE REQUIREMENTS OF DRAWINGS MH-1.



THE BOTTOM MAY BE PRECAST SEPARATELY AND THE OUTLET PIPE PLACED ON TOP OF IT SHAPED TO DRAIN.



PLAN OF CATCH BASIN AND PAVEMENT JOINTS
* DOWEL LOCATION FOR CURB AND GUTTER



SECTION C-C
GRATE SIZE 2'-5 1/2" x 1'-4 3/8" x 2" (2 REQUIRED)
STANDARD GRATE

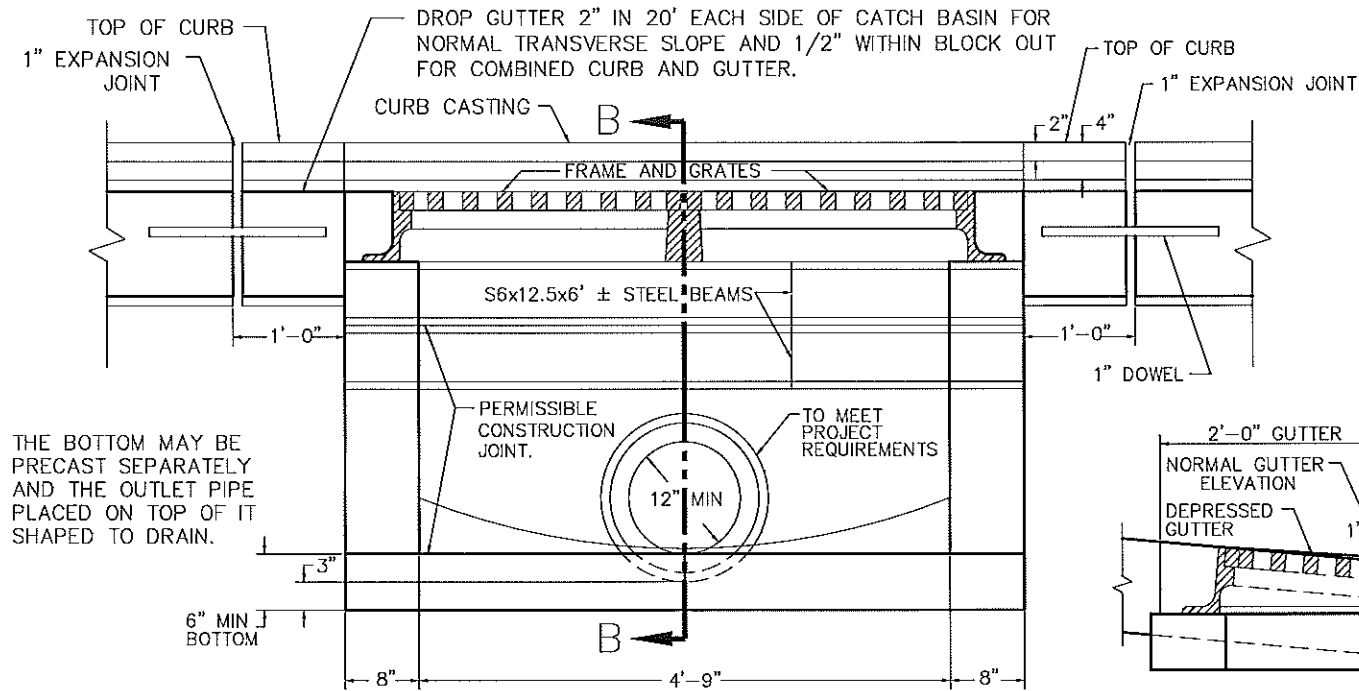
REVISIONS	DATE	C-6

CATCH BASIN NO. 3

CHK. BY: C.A.H. EFFECTIVE DATE: 1-1-94

BUTLER COUNTY ENGINEERS OFFICE
AND OPERATIONS FACILITY

1921 FAIRGROVE AVENUE - HAMILTON, OHIO
PHONE 867-5744 45011



NOTES

GRATES: Two required. For details, see SCD CB-2.2. Grate "V" shall be provided unless the plans specifically require the diagonal grate. If the diagonal grate is specified, it shall be placed so that the diagonal bars direct drainage flow toward the curb.

CASTINGS: The design shall be essentially the same and equally as strong as shown. Minimum weight (mass):

Curb Casting 305 lbs. (138 kg)
Two Grates 254 lbs. (115 kg)
Frame 530 lbs. (237 kg), and
Two Grates "V" 210 lbs. (95 kg).

Lighter weight frames and grates that meet the requirements of CMS 711.14 may also be provided. Grate openings and dimensions shall not differ from those shown, unless otherwise shown in the plans.

The following text shall be cast into the top of the curb casting:

"DUMP NO WASTE" and "DRAINS TO WATERWAY"

Text shall be printed in bold, capital letters with a minimum height of 3/4". See example on Plan & Section. "WATERWAY" may be substituted with "STREAM", "RIVER", "LAKE", etc. Actual placement and logo may vary per manufacturer.

BEARING AREAS: The frame and grate shall be so fitted and finished as to provide a firm and even seat. No projections shall exist on bearing areas and the grate shall seat in its frame without rocking.

WALLS: When used in place of concrete, brick side walls shall be 8" (200) nominal thickness.

PRECAST CONSTRUCTION: Permitted, except for the apron. Concrete shall meet requirements of CMS 706.13. Precast walls shall have a minimum thickness of 6" (150) and reinforcing shall be sufficient to permit shipping and placement without damage. The wall thickness reduction shall be from the outside.

MINIMUM DEPTH: The minimum depth is per the cover requirements for that pipe type.

OPENINGS: Any pipe openings greater than 4" (100) from the outside of the pipe to the structure require the Engineer's approval. Fill all voids per CMS 604.

DOWELS: Four 1"x18" (25x450) dowels are required for concrete pavement or gutter blockout. See SCD BP-2.2 for dowel details.

BLOCKOUT: Blockouts shall be paved with Class C concrete in PCC pavement or gutter, and paid for as part of the pavement or gutter quantities because of the castings. A Class C concrete apron, the size of the 2'-0" (600) gutter blockout, shall be cast-in-place in asphalt pavement (no dowels required) with the cost included in the catch basin bid price. No deduction to be made in curb quantities.

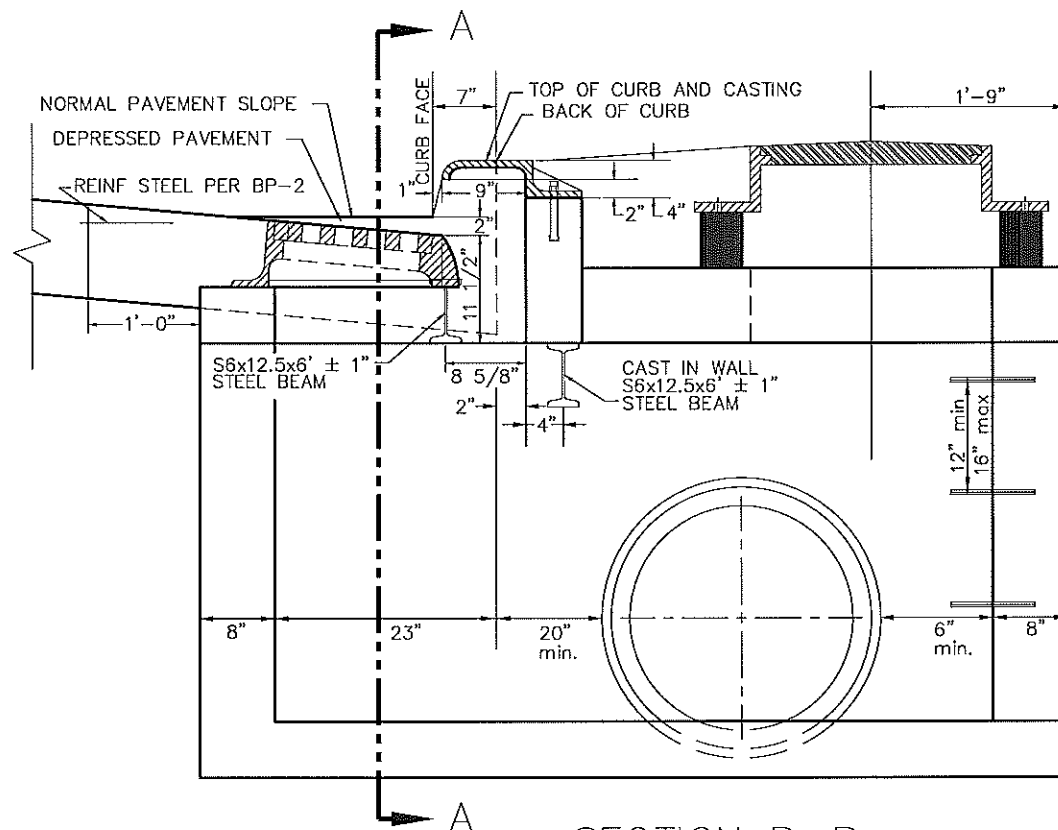
PAYMENT: All materials and labor, including excavation and backfilling, shall be paid for under Item 604 - Catch Basin, No. 3 Modified.

REINFORCING STEEL: All reinforcing steel shall have 2" clear cover unless otherwise noted.

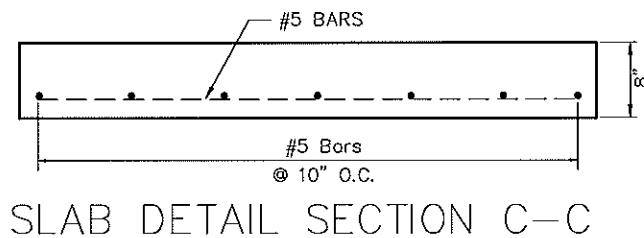
STEPS: SHALL BE PROVIDED WHERE THE DEPTH EXCEEDS 48" AND SHALL MEET THE REQUIREMENTS OF DRAWING MH-1.

SECTION A-A

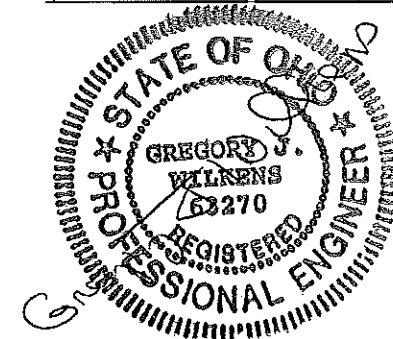
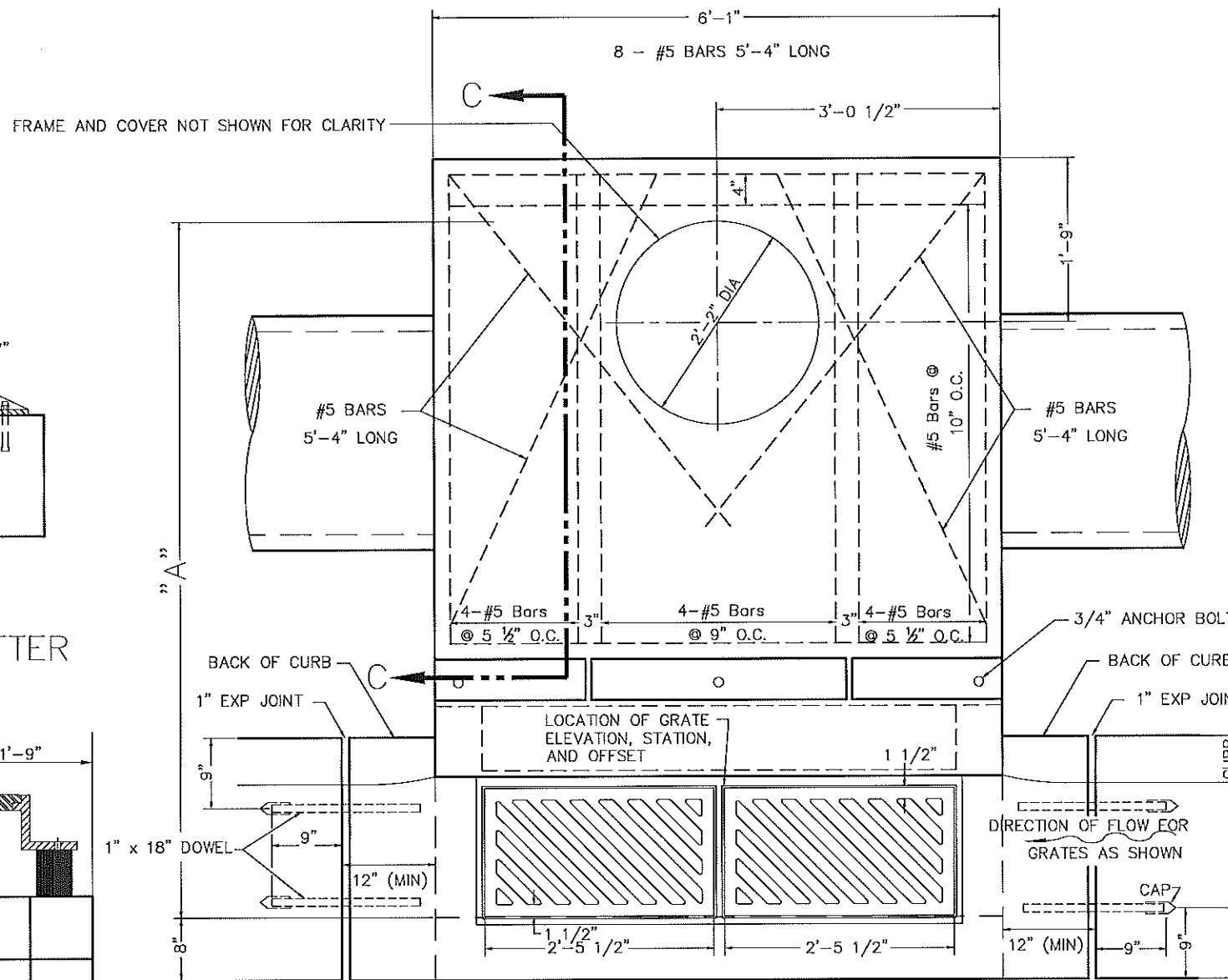
SECTION B-B
WITH CURB & GUTTER



SECTION B-B



SLAB DETAIL SECTION C-C



PLAN OF CATCH BASIN AND PAVEMENT JOINTS

* DOWEL LOCATION FOR CURB AND GUTTER

PIPE SIZE	dim. "A"
12" - 21"	80"
24" - 27"	89"
30" - 36"	99"

REVISIONS	DATE	C-7
SLAB REBAR	12/29/11	
SEC. C	01/06/12	
SEC. BB	01/06/12	

CATCH BASIN
NO. 3
MODIFIED

CHK. BY: C.A.H. EFFECTIVE DATE: 1-1-94

BUTLER COUNTY ENGINEERS OFFICE
AND OPERATIONS FACILITY

1921 FAIRGROVE AVENUE - HAMILTON, OHIO
PHONE 867-5744 45011

NOTES

GRATES:

STANDARD GRATE AS SHOWN IN THE PLAN VIEW SHALL BE PROVIDED UNLESS THE PLANS SPECIFICALLY REQUIRE GRATE "V". PLACE GRATE SO THE DIAGONAL BARS DIRECT DRAINAGE FLOW TOWARD THE CURB. ALL BAR EDGES TO BE ROUNDED 1/8" RADIUS.

CASTINGS:

THE DESIGN SHALL BE ESSENTIALLY THE SAME AND EQUALLY AS STRONG AS THOSE SHOWN HERON. MINIMUM WEIGHTS ARE: CURB CASTING 170 LBS., STANDARD GRATE 127 LBS., FRAME 320 LBS., AND "V" GRATE 105 LBS. BEARING AREAS OF FRAME AND GRATE SHALL BE SO FITTED AND FINISHED AS TO PROVIDE A FIRM AND EVEN SEAT FOR ALL PORTIONS OF THE GRATE IN THE FRAME NO PROJECTIONS SHALL EXIST ON BEARING AREAS OF EITHER CASTING AND THE GRATE WITHOUT ROCKING.

DOWELS:

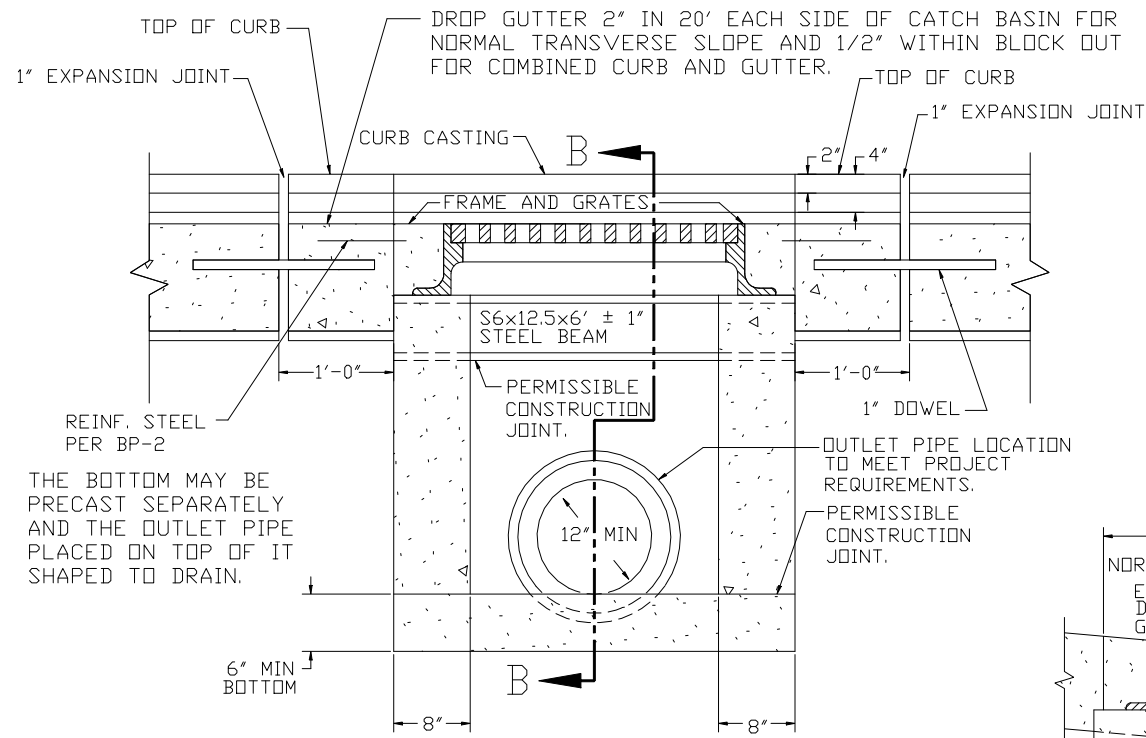
FOUR 1" x 18" ARE REQUIRED FOR CONCRETE PAVEMENT OF GUTTER BLOCKOUT. SEE ODOT BP-4 FOR DOWEL DETAILS.

BRICK OR CONCRETE BLOCK SIDE WALLS WHEN USED IN PLACE OF CONCRETE, SHALL BE 8" NOMINAL THICKNESS.

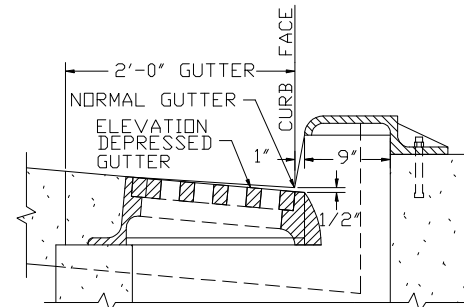
BLOCKOUT SHALL BE PAVED WITH CLASS C CONCRETE IN PCC PAVEMENT OR GUTTER AND PAID FOR AS PART OF THE PAVEMENT OR GUTTER WITH NO DEDUCTION IN PAVEMENT, CURB OR GUTTER QUANTITIES BECAUSE OF CASTINGS. A CLASS C CONCRETE APRON THE SIZE OF THE 2' GUTTER BLOCKOUT SHALL BE CAST IN PLACE IN ASPHALT PAVEMENT (NO DOWELS REQUIRED) WITH THE COST INCLUDED IN THE CATCH BASIN BID PRICE. NO DEDUCTIN TO BE MADE IN CURB QUANTITIES.

PRECAST CONSTRUCTION IS PERMITTED, EXCEPT FOR APRON, AND CONCRETE SHALL MEET REQUIREMENTS OF 706.13 WITH 6± 2% AIR VOID CONTENT IN THE HARDENED CONCRETE. PRECAST WALLS SHALL HAVE A MINIMUM THICKNESS OF 6" AND REINFORCING SHALL BE SUFFICIENT TO PERMIT SHIPPING AND PLACEMENT WITHOUT DAMAGE.

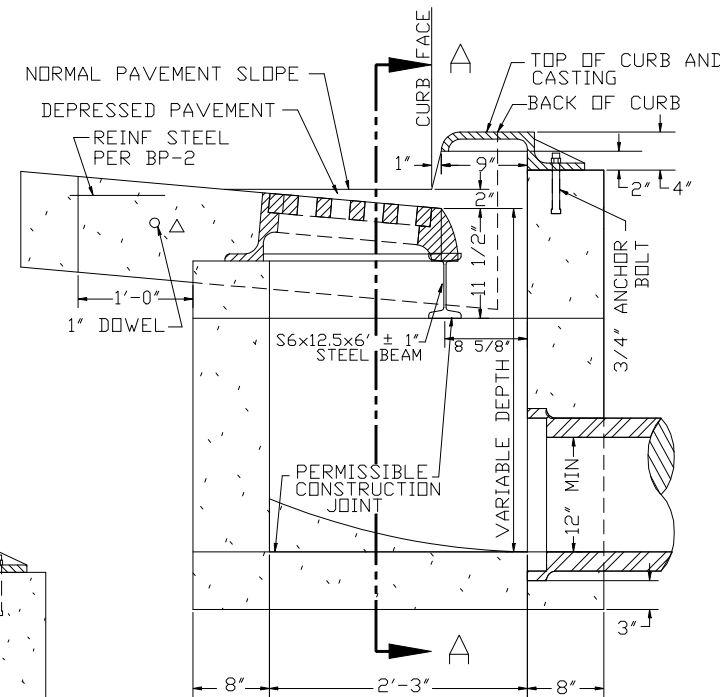
STEPS SHALL BE PROVIDED WHERE THE DEPTH EXCEEDS 48" AND SHALL MEET THE REQUIREMENTS OF DRAWING MH-1.



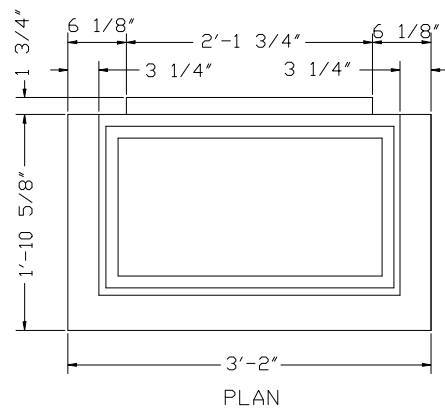
SECTION A-A



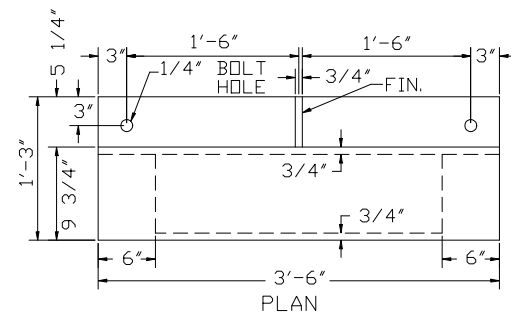
SECTION B-B WITH CURB & GUTTER



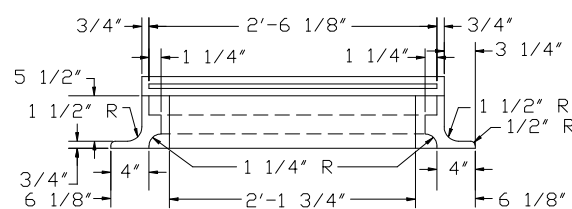
SECTION B-B



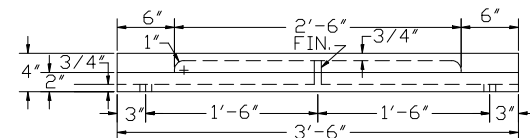
PLAN



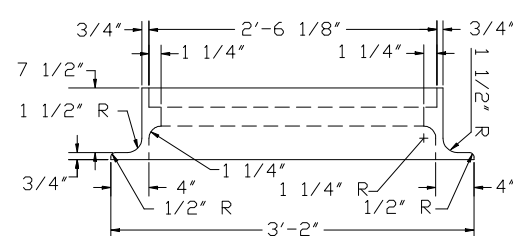
PLAN



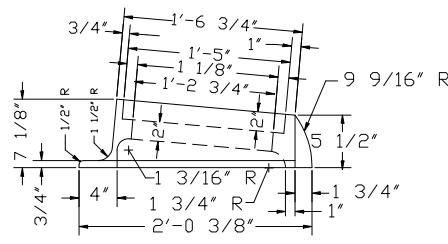
BACK VIEW



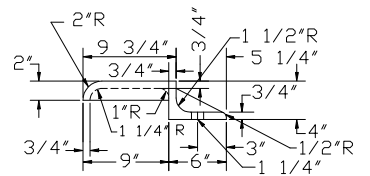
FRONT VIEW CURB CASTING



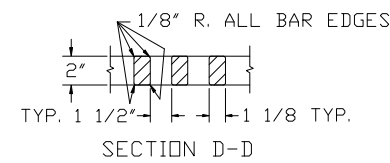
FRONT VIEW FRAME



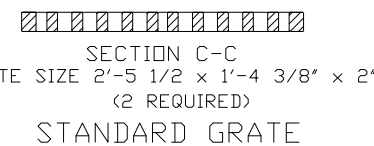
END VIEW FRAME



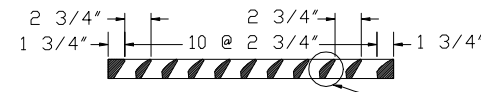
END VIEW CURB CASTING



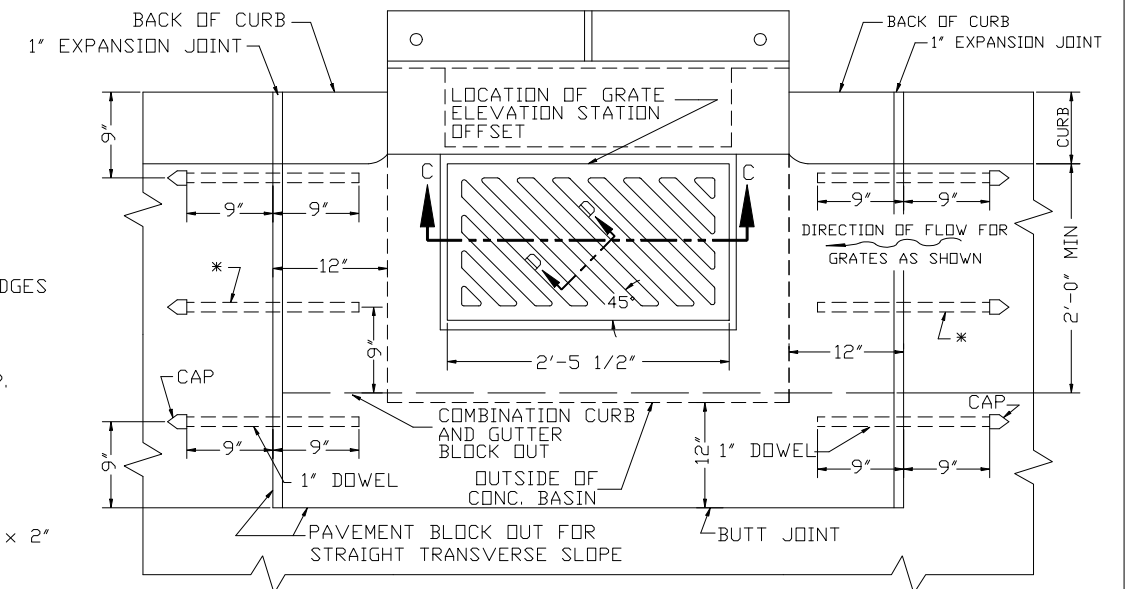
SECTION D-D



SECTION C-C
GRATE SIZE 2'-5 1/2" x 1'-4 3/8" x 2"
(2 REQUIRED)
STANDARD GRATE



PLAN GRATE "V"



PLAN OF CATCH BASIN AND PAVEMENT JOINTS

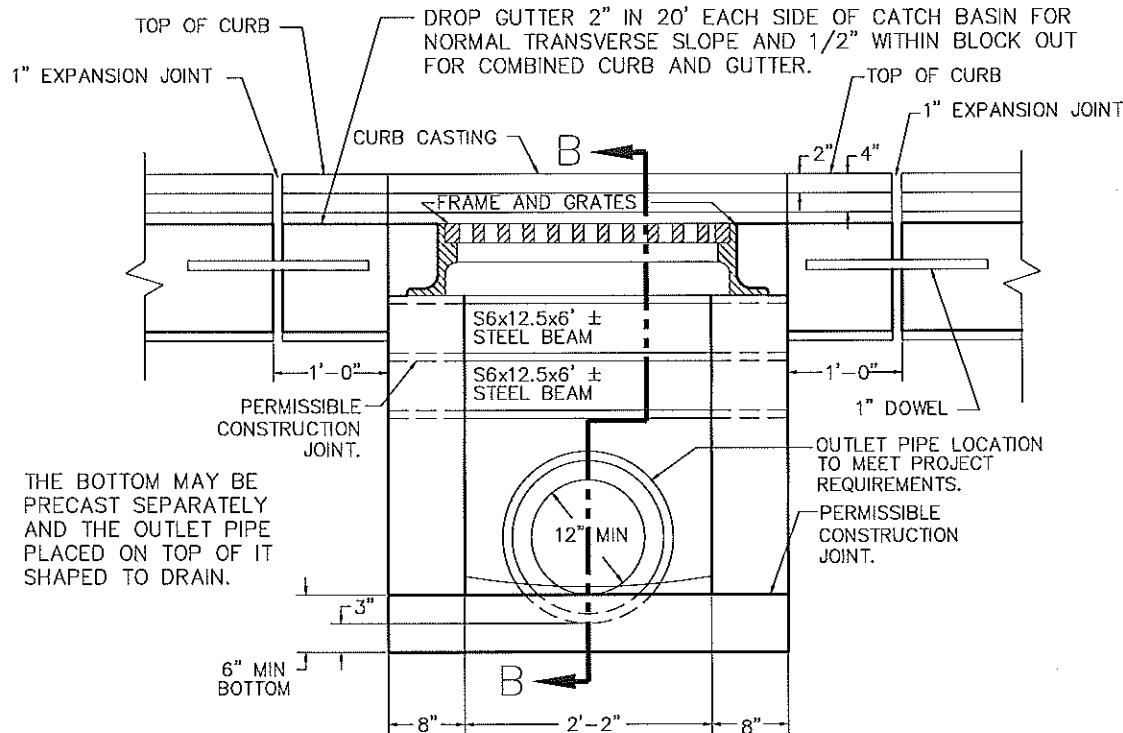
* DOWEL LOCATION FOR CURB AND GUTTER

REVISIONS	DATE	C-8

CATCH BASIN NO. 3A

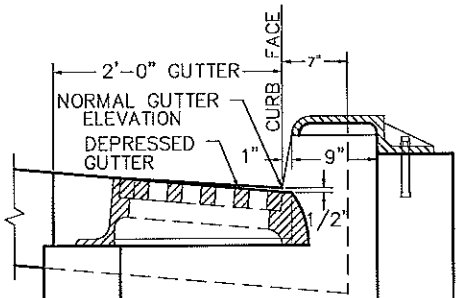
CHK. BY: C.A.H. EFFECTIVE DATE: 1-1-94

BUTLER COUNTY ENGINEERS OFFICE AND OPERATIONS FACILITY
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PHONE 867-5744 45011

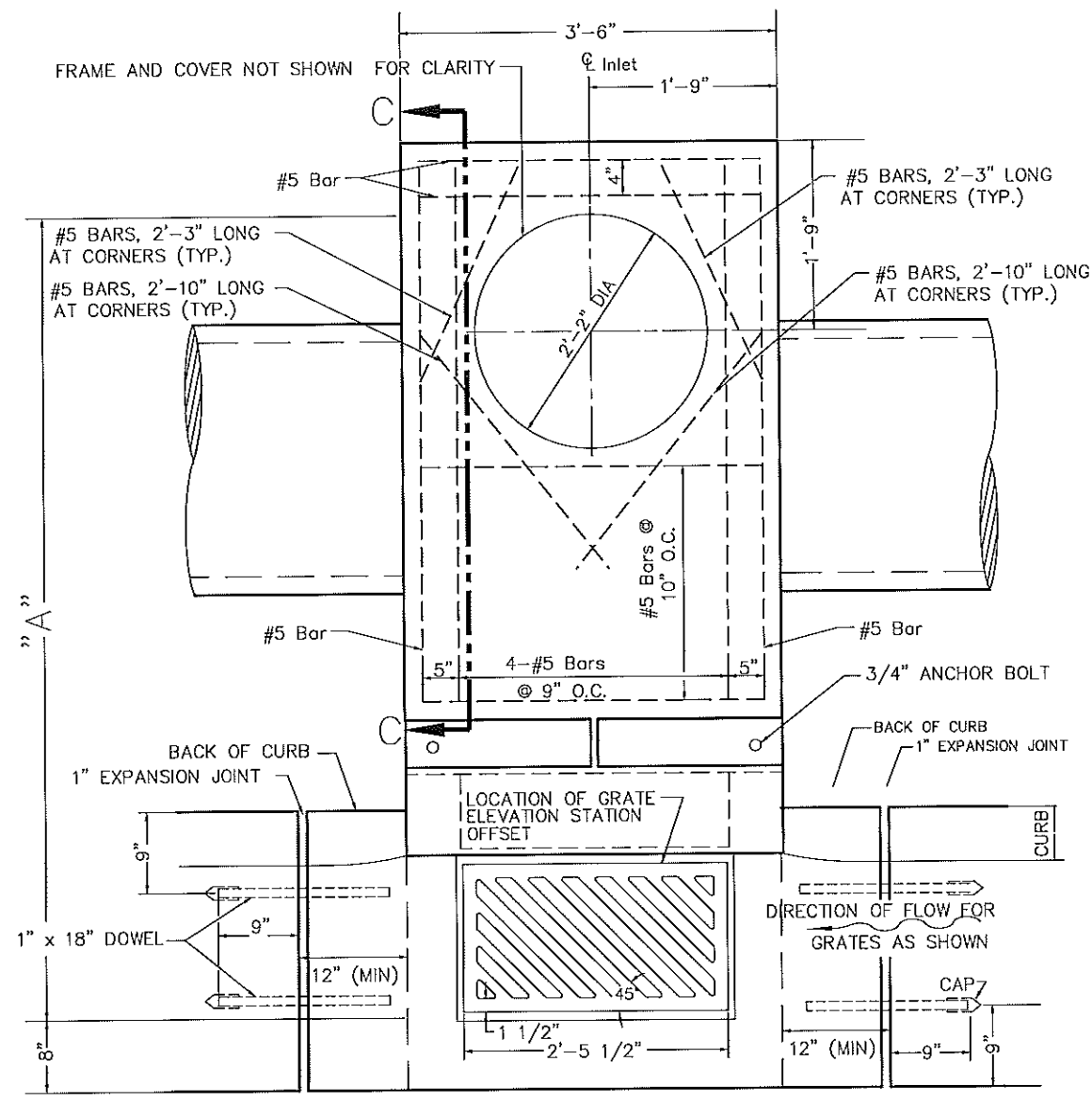


SECTION A-A

PIPE SIZE	dim. "A"
12" - 21"	80"
24" - 27"	89"
30" - 36"	99"

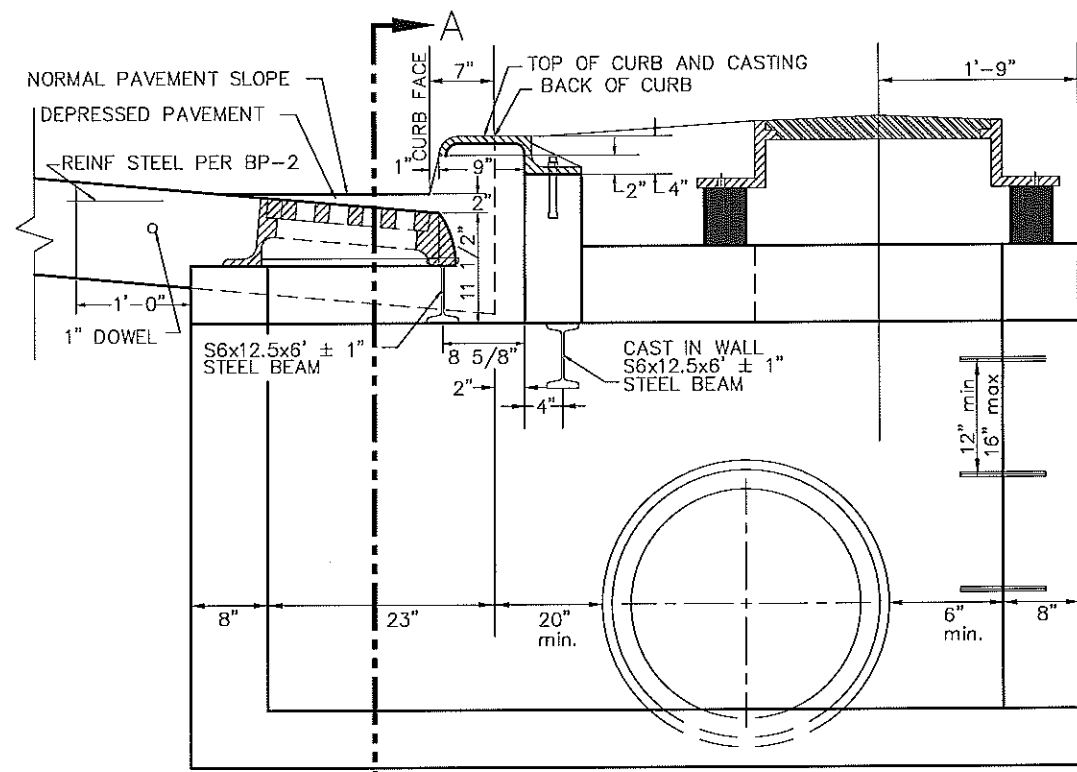


SECTION B-B WITH CURB & GUTTER

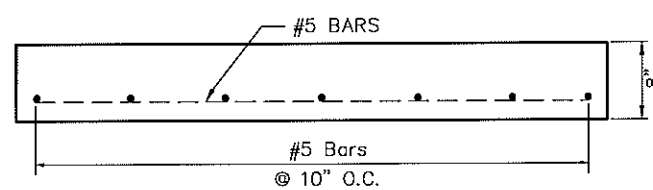


PLAN OF CATCH BASIN AND PAVEMENT JOINTS

NOTES
GRATES: Two required. For details, see SCD CB-2.2. Grate "V" shall be provided unless the plans specifically require the diagonal grate. If the diagonal grate is specified, it shall be placed so that the diagonal bars direct drainage flow toward the curb.
CASTINGS: The design shall be essentially the same and equally as strong as shown.
 Minimum weight (mass):
 Curb Casting 305 lbs. (138 kg)
 Two Grates 254 lbs. (115 kg)
 Frame 590 lbs. (267 kg), and
 Two Grate "V" 210 lbs. (95 kg).
 Lighter weight frames and grates that meet the requirements of CMS 711.14 may also be provided. Grate openings and dimensions shall not differ from those shown, unless otherwise shown in the plans.
 The following text shall be cast into the top of the curb casting:
"DUMP NO WASTE" and "DRAINS TO WATERWAY"
 Text shall be printed in bold, capital letters with a minimum height of 3/4". See example on Plan & Section. "WATERWAY" may be substituted with "STREAM", "RIVER", "LAKE", etc. Actual placement and logo may vary per manufacturer.
BEARING AREAS: The frame and grate shall be so fitted and finished as to provide a firm and even seat. No projections shall exist on bearing areas and the grate shall seat in its frame without rocking.
WALLS: When used in place of concrete, brick side walls shall be 8" (200) nominal thickness.
PRECAST CONSTRUCTION: Permitted, except for the apron. Concrete shall meet requirements of CMS 706.13. Precast walls shall have a minimum thickness of 6" (150) and reinforcing shall be sufficient to permit shipping and placement without damage. The wall thickness reduction shall be from the outside.
MINIMUM DEPTH: The minimum depth is per the cover requirements for that pipe type.
OPENINGS: Any pipe openings greater than 4" (100) from the outside of the pipe to the structure require the Engineer's approval. Fill all voids per CMS 604.
DOWELS: Four 1"x18" (25x450) dowels are required for concrete pavement or gutter blockout. See SCD BP-2.2 for dowel details.
BLOCKOUT: Blockouts shall be paved with Class C concrete in PCC pavement or gutter, and paid for as part of the pavement or gutter with no deduction in pavement curb or gutter quantities because of the castings. A Class C concrete apron, the size of the 2'-0" (600) gutter blockout, shall be cast-in-place in asphalt pavement (no dowels required) with the cost included in the catch basin bid price. No deduction to be made in curb quantities.
PAYMENT: All materials and labor, including excavation and backfilling, shall be paid for under Item 604 - Catch Basin, No. 3A Modified.
REINFORCING STEEL: All reinforcing steel shall have 2" clear cover unless otherwise noted.
STEPS: SHALL BE PROVIDED WHERE THE DEPTH EXCEEDS 48" AND SHALL MEET THE REQUIREMENTS OF DRAWING MH-1.

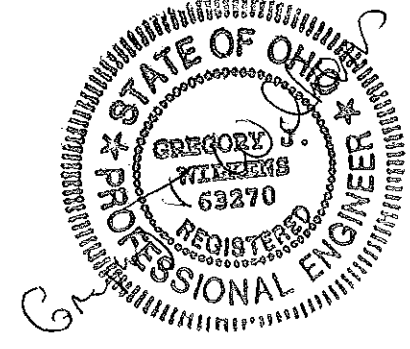


SECTION B-B



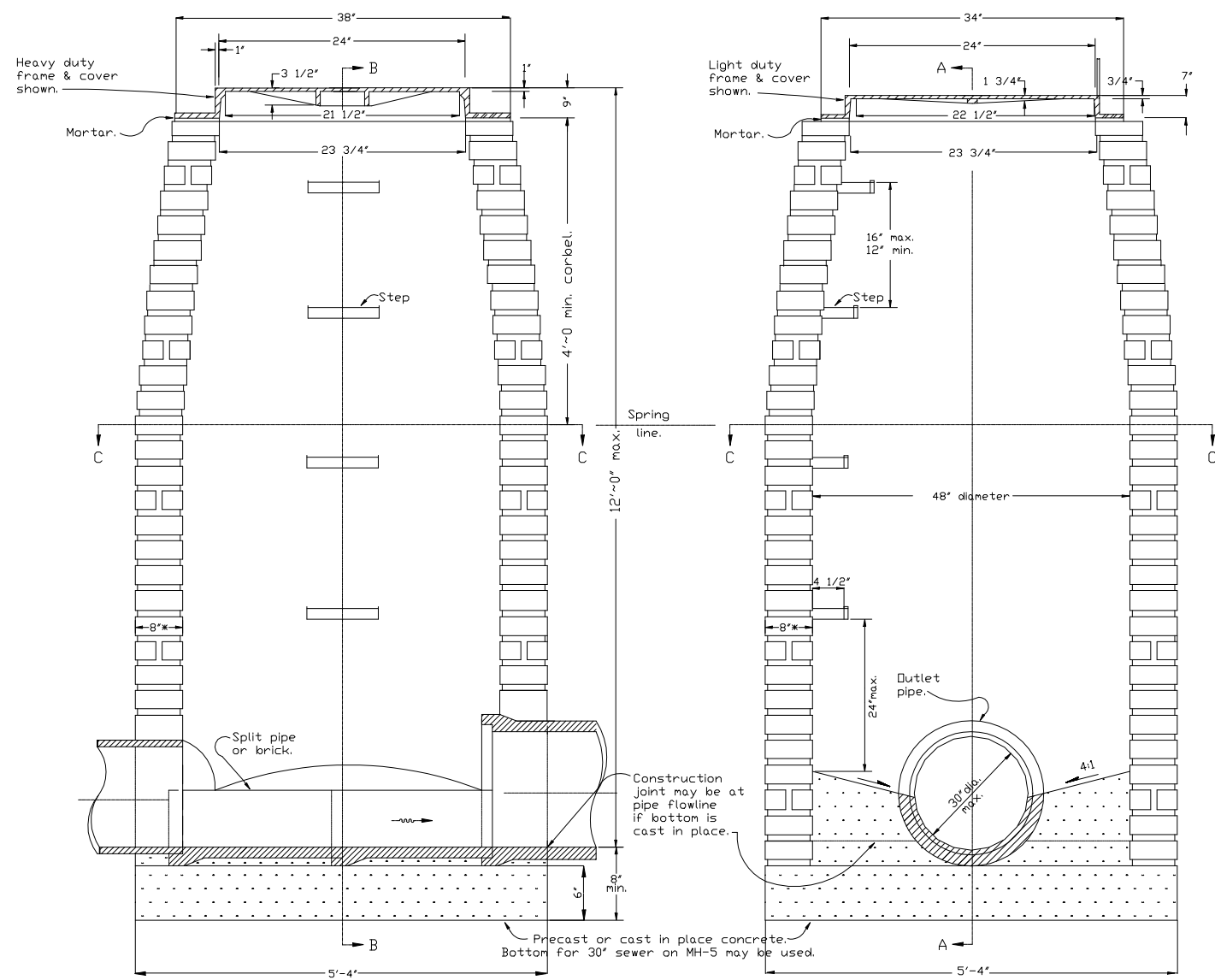
SLAB DETAIL SECTION C-C

* DOWEL LOCATION FOR CURB AND GUTTER

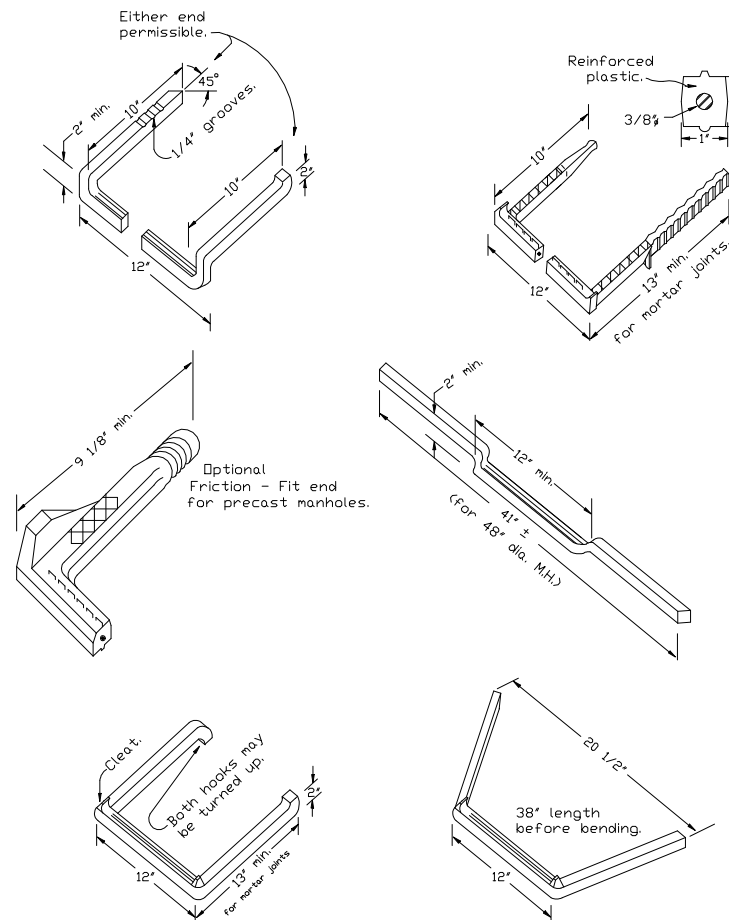
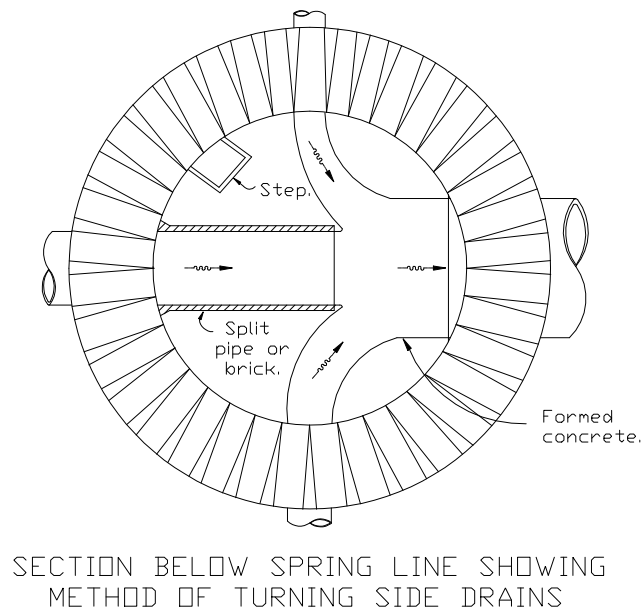
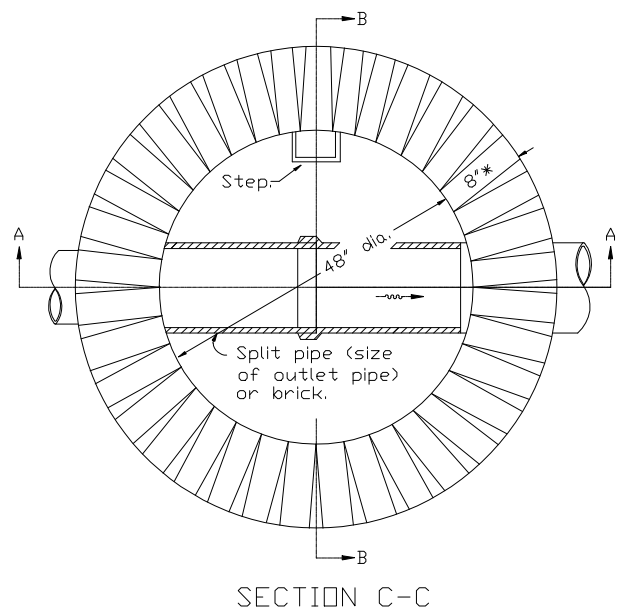


REVISIONS	DATE	C-9
SLAB REBAR	12/29/11	
SEC. C	01/06/12	
SEC. BB	01/06/12	

CATCH BASIN NO. 3A-MOD.
 CHK. BY: G.J.W. EFFECTIVE DATE: 1-1-94
 BUTLER COUNTY ENGINEERS OFFICE AND OPERATIONS FACILITY
 1921 FAIRGROVE AVENUE - HAMILTON, OHIO 45011
 PHONE 867-5744

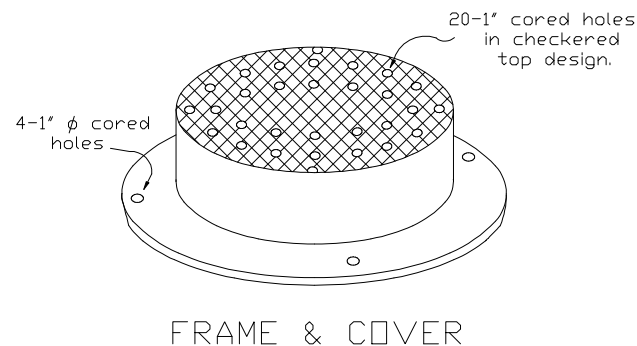
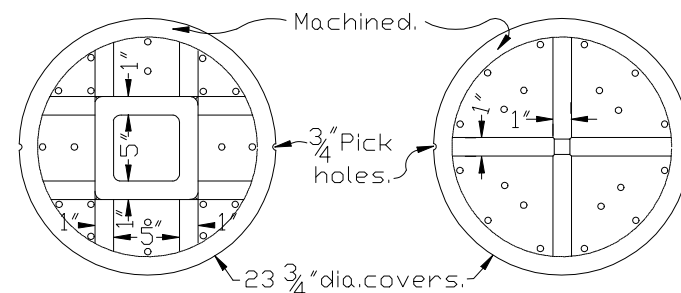


* Nominal thickness



STEP DETAILS

Steps shall have a minimum cross sectional dimension of one inch for ferrous metal and 3/4" for aluminum.



NOTES

CONSTRUCTION: No.1 manhole is for sewers 30" diameter or less. The design shown is for brick construction with every sixth course a stretcher course. The 6" bottom may be precast or cast in place concrete. The bottom channel sections shall be built with concrete and lined with split pipe or brick except curved channels may be formed in the concrete.

Precast solid concrete radial blocks or cast in place concrete reinforced with No.4 bars on 12" centers both vertically and horizontally, may be used with a wall thickness of 6" or greater. Precast manholes detailed on MH-3 or MH-5 may be used in lieu of the design shown hereon unless otherwise required by the plans.

FRAME AND COVERS shall be of heavy design (475 lbs. min. total weight) when the manhole is placed within the limits of the pavement or shoulder, otherwise the light design shall be finished smooth and fitted so as to provide a firm and even seat to all portions of the cover in the frame. Each cover shall seat in its frame without rocking and shall be marked as a matched frame and cover before delivery to the project. The base of the frame shall be set in a full bed of Portland cement mortar, and so adjusted to conform to the finished pavement or shoulder elevation and slope. Castings meeting Item 604 requirements and designed essentially the same and equally as strong those shown hereon shall be provided.

STEPS shall conform to the material requirements of specification 604. All steps shall have a depressed tread or a 1/2" minimum cleat height at the ends. Steps installed in fresh concrete shall be embedded to minimum depth of 4". Steps installed in mortar joints shall be embedded to a minimum depth of 7". Friction-fit steps meeting the requirements of 711.31 with a 1/2" diameter rebar may be used in precast manholes. The receiving holes for friction-fit steps shall not penetrate the manhole wall.

The Engineer may require the contractor to test load a maximum of one step per manhole to a proof load of 400 lbs. in direct pull. The equipment and method used shall meet the approval of the Engineer. If the selected step fails the pullout test, the remaining steps in that manhole shall also be tested. All steps not passing the pullout test shall be removed and a new step installed and tested to the satisfaction of the Engineer. Cost of testing shall be incidental to the unit price bid for the manhole.

DROP PIPE, when specified on the plans, shall be constructed as shown on MH-2.

SANITARY SEWER COVERS shall be without the pick and vent holes shown hereon and shall include a sealing gasket affixed to the bearing surface. Bolt-down covers shall not be used unless specified in the plans.

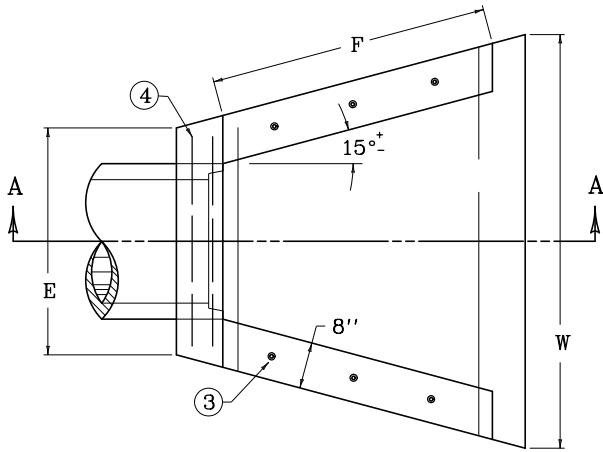
REVISIONS	DATE

TYPICAL MANHOLE
DETAIL
MH-1

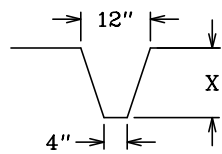
CHK. BY: C.A.H. EFFECTIVE DATE: 1-1-94

BUTLER COUNTY ENGINEERS OFFICE
AND OPERATIONS FACILITY

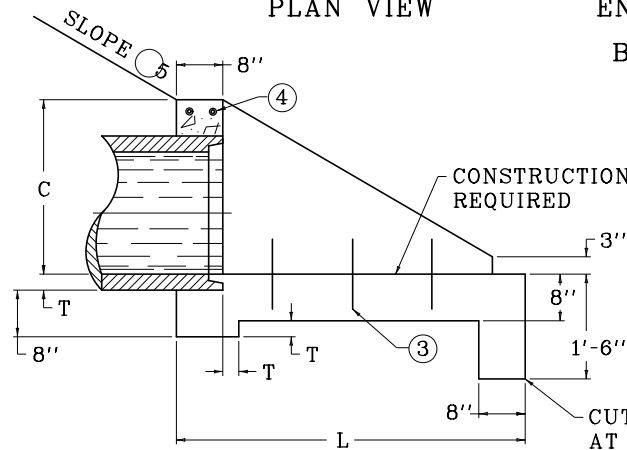
1921 FAIRGROVE AVENUE - HAMILTON, OHIO
PHONE 867-5744 45011



PLAN VIEW



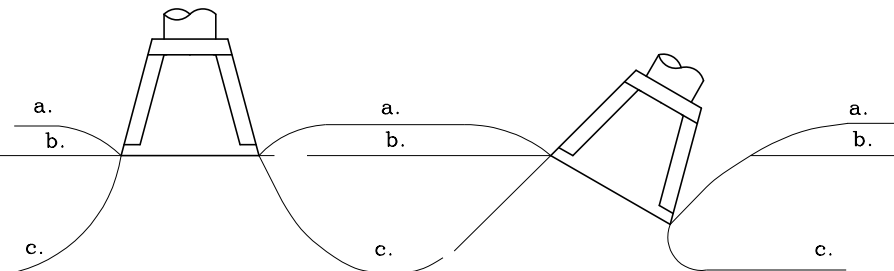
ENERGY DISSIPATION
BLOCKS (OPTIONAL)



SECTION A-A

CONSTRUCTION JT.
REQUIRED

CUT OFF TOE WALL
AT ROCK LINE WHEN
ENCOUNTERED.



TOE OF SLOPES:

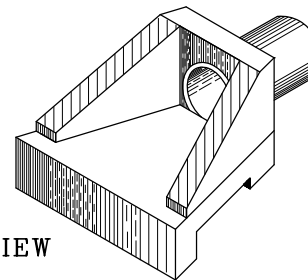
- a. STEEPER THAN 2:1
- b. 2:1
- c. FLATTER THAN 2:1

⑤

PIPE		DIMENSIONS							CLASS A CONC	REINF STEEL
DIA. OR EQUIV. DIA.	SHAPE	C	E	F	L	W	T	X	C. Y.	LBS.
12"	○	1'-9"	2'-6"	2'-3"	3'-6"	4'-0"	2"	12"	0.58	7
15"	○	2'-0"	2'-9"	2'-9"	4'-0"	4'-9"	2 1/4"	13 1/2"	0.75	8
	○	1'-9"	3'-0"	2'-6"	3'-6"	4'-9"				
18"	○	2'-3"	3'-0"	3'-6"	4'-6"	5'-3"	2 1/2"	15"	0.93	9
	○	2'-0"	3'-6"	3'-0"	4'-0"	5'-6"				
21"	○	2'-6"	3'-3"	4'-0"	5'-0"	6'-0"	2 3/4"		1.14	8
	○	2'-3"	3'-0"	3'-6"	4'-6"	6'-0"				
24"	○	2'-9"	3'-6"	4'-6"	5'-6"	6'-6"	3"	18"	1.35	9
	○	2'-6"	4'-0"	4'-0"	5'-0"	6'-9"				
27"	○	3'-0"	3'-9"	5'-0"	6'-0"	7'-0"	3 1/4"		1.57	10
	○	2'-9"	4'-6"	4'-3"	5'-3"	7'-3"				

NOTES

1. DIMENSIONS AND QUANTITIES ARE BASED ON CONCRETE PIPE AND WILL VARY INSIGNIFICANTLY FOR CORRUGATED METAL PIPE.
2. REINFORCING STEEL : MINIMUM GRADE 40, BARS EVENLY SPACED.
- ③ 6 - NO. 4 x 1'-0" DOWEL BARS.
- ④ 2 - NO. 4 x (E DIMENSION MINUS 4").
- ⑤ SLOPES SHALL BE WARPED TO FIT HEADWALL WHEN PIPE IS SKEWED AND/OR NORMAL SLOPE VARIES FROM 2:1.
6. VOLUME DISPLACED BY PIPE COMPUTED USING INSIDE DIAMETER OF PIPE.
7. WING ANGLES AND/OR DIMENSIONS MAY BE ALTERED DURING CONSTRUCTION TO ACCOMMODATE FLOW OF WATER.
8. APRON BETWEEN WINGS SHALL BE SLOPED IN DIRECTION OF FLOW EQUAL TO SLOPE OF PIPE. FRONT FACE OF HEADWALL SHALL REMAIN VERTICAL.



ISOMETRIC VIEW

REVISIONS	DATE	C-13A

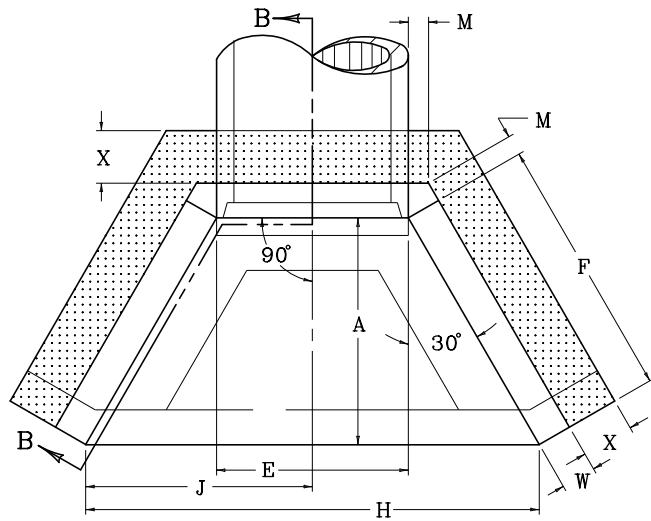
12" - 27"
SLOPE/HILLSIDE

CHK. BY: EJP EFFECTIVE DATE: 1-1-2010

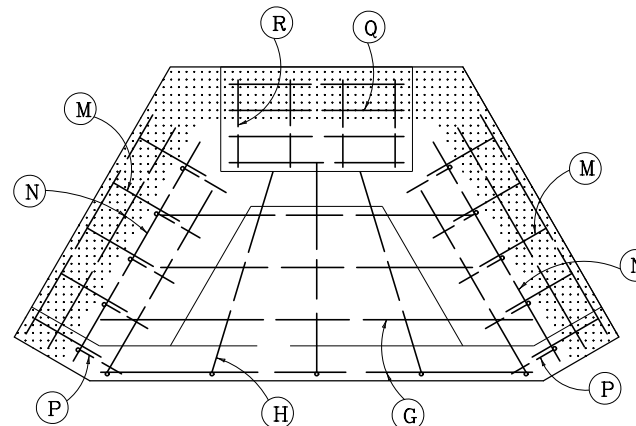
BUTLER COUNTY ENGINEERS OFFICE
AND OPERATIONS FACILITY

1921 FARGROVE AVENUE - HAMILTON, OHIO
PHONE 867-5744 45011

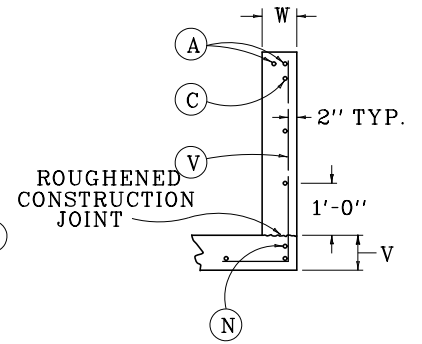
SHEET
1 OF 6



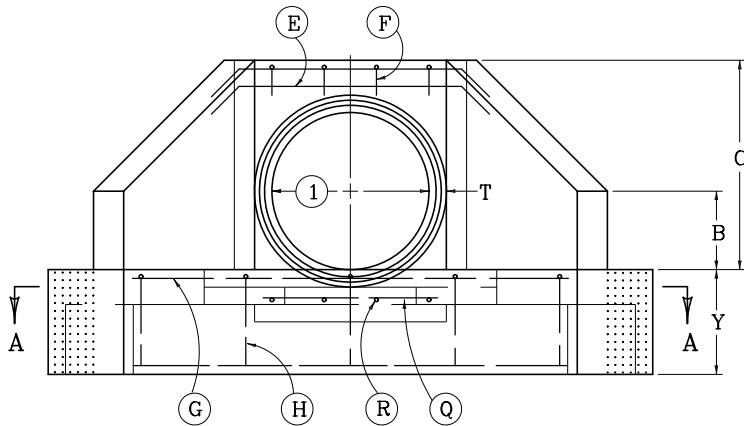
PLAN VIEW



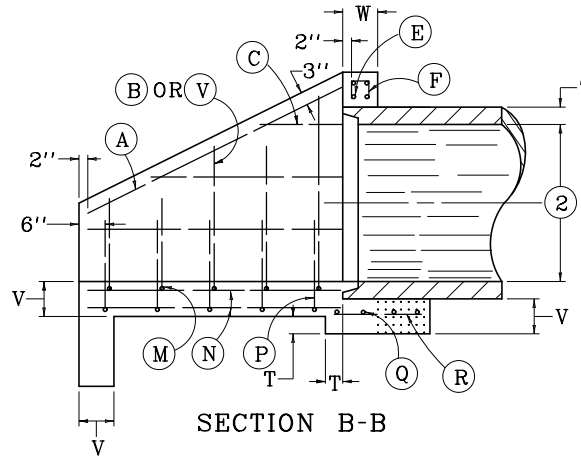
SECTION A-A



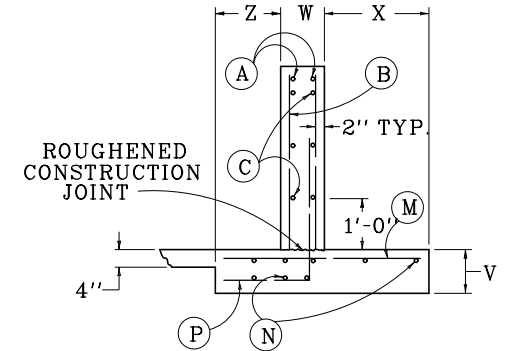
WING SECTION
30'' TO 60'' CIRCULAR PIPE
30'' TO 72'' NON-CIRCULAR PIPE



FRONT ELEVATION

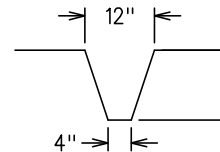


SECTION B-B



WING SECTION
66'' TO 108'' CIRCULAR PIPE

ENERGY DISSIPATION
BLOCKS (OPTIONAL)



- ① DIAMETER OF CIRCULAR PIPE OR SPAN OF NON-CIRCULAR PIPE
- ② DIAMETER OF CIRCULAR PIPE OR RISE OF NON-CIRCULAR PIPE
3. [Dotted pattern] APPLIES TO 66" DIAMETER AND GREATER. (CIRCULAR PIPE)
4. SEE CURRENT STANDARD DRAWINGS FOR DIMENSIONS, QUANTITIES, AND BILL OF REINFORCEMENT.
5. DIMENSIONS FROM FACE OF CONCRETE TO STEEL SHALL BE 2" CLEAR DISTANCE.
6. ENCIRCLED LETTERS INDICATE STEEL BAR LOCATIONS
7. BARS (B), (C), (G), (P), (M), (V) ARE SPACED 1'-0" O.C. ALL OTHER BARS SHALL BE EVENLY SPACED.
8. BARS (B) AND (V) ARE PLACED IN ORDER OF INCREASING LENGTHS, BEGINNING AT THE END OF EACH WING.
9. BARS (C) ARE PLACED IN ORDER OF INCREASING LENGTHS, BEGINNING AT THE TOP OF EACH WING.
10. HEADWALLS LOCATED AT EDGE OF SHOULDER SHALL BE PARALLEL TO CENTERLINE OF THE ROAD.
11. APRON BETWEEN WINGS SHALL BE SLOPED IN DIRECTION OF FLOW EQUAL TO SLOPE OF PIPE. FRONT FACE OF HEADWALL AND ENDS OF WINGS SHALL REMAIN VERTICAL.

DIA.	30"	36"	42"	48"	54"	60"
Y	21"	24"	27"	30"	33"	36"

(LAYOUT AND STEEL PATTERN)

REVISIONS	DATE	
		PIPE CULVERT HEADWALLS
		0° SKEW
		30" - 66"
		CHK. BY: EJP EFFECTIVE DATE: 1-1-2010
		BUTLER COUNTY ENGINEERS OFFICE AND OPERATIONS FACILITY
		1921 FARGROVE AVENUE - HAMILTON, OHIO 45011
		PHONE 867-5744
		SHEET 2 OF 6

DIMENSION	DIAMETER OF PIPE							DIMENSION
	30''	36''	42''	48''	54''	60''	66''	
A	3'-9''	4'-4''	4'-11''	5'-6''	6'-1''	6'-8''	7'-5''	A
B	1'-3''	1'-6''	1'-9''	2'-0''	2'-3''	2'-6''	2'-9''	B
C	3'-6''	4'-0''	4'-7''	5'-1''	5'-8''	6'-2''	7'-0''	C
E	3'-1''	3'-8''	4'-3''	4'-10''	5'-5''	6'-0''	6'-7''	E
F	4'-4''	5'-0''	5'-8''	6'-4''	7'-0''	7'-8''	8'-7''	F
H	7'-6''	8'-8''	10'-0''	11'-2''	12'-6''	13'-8''	15'-2''	H
J	3'-9''	4'-4''	5'-0''	5'-7''	6'-3''	6'-10''	7'-7''	J
M	0'-5''						0'-6''	M
T	0'-3.5''	0'-4.0''	0'-4.5''	0'-5.0''	0'-5.5''	0'-6.0''	0'-6.5''	T
V	0'-8''						1'-0''	V
W	0'-8''						0'-10''	W
X	----						2'-0''	X
Y	2'-0''						2'-6''	Y
Z	----						1'-3''	Z
CU. YDS. CONC. 2 HEADWALLS	3.36	4.30	5.35	6.53	7.82	9.22	18.76	CU. YDS. CONC. 2 HEADWALLS
LBS. STEEL 2 HEADWALLS	281	363	430	496	583	687	1320	LBS. STEEL 2 HEADWALLS

DIMENSIONS AND QUANTITIES ARE BASED ON CONCRETE PIPE AND WILL VARY SLIGHTLY FOR CORRUGATED METAL PIPE.

USE WITH SHEET 2 OF 6

REVISIONS	DATE

DIMENSIONS & QUANTITIES
 30"-66" HEADWALLS
 CIRCULAR PIPE, 0° SKEW

CHK. BY: EJP EFFECTIVE DATE: 1-1-2010
 BUTLER COUNTY ENGINEERS OFFICE
 AND OPERATIONS FACILITY

1921 FARGROVE AVENUE - HAMILTON, OHIO
 PHONE 867-5744 45011

SHEET
3 OF 6

DIMENSION	NON-CIRCULAR PIPE : EQUIVALENT ROUND SIZES							DIMENSION
	30''	36''	42''	48''	54''	60''	66''	
A	3'-4''	3'-10''	4'-4''	4'-9''	5'-3''	5'-9''	6'-3''	A
B	1'-0''	1'-3''	1'-5''	1'-7''	1'-10''	2'-0''	2'-3''	B
C	3'-0''	3'-6''	3'-11''	4'-4''	4'-9''	5'-3''	5'-8''	C
E	3'-10''	4'-6''	5'-3''	5'-11''	6'-8''	7'-5''	8'-1''	E
F	3'-10''	4'-5''	5'-0''	5'-6''	6'-1''	6'-8''	7'-3''	F
G	3'-10''	4'-5''	5'-0''	5'-6''	6'-1''	6'-8''	7'-3''	G
H	7'-8''	9'-0''	10'-4''	11'-4''	12'-8''	14'-0''	15'-4''	H
J	3'-10''	4'-6''	5'-2''	5'-8''	6'-4''	7'-0''	7'-8''	J
M	0'-5''							M
N	0'-5''							N
T	0'-3.75''	0'-4.5''	0'-5.0''	0'-5.5''	0'-6.0''	0'-6.5''	0'-7.0''	T
V	0'-8''							V
W	0'-8''							W
Y	2'-0''							Y
CU.YDS.CONC. 2 HEADWALLS	3.07	3.94	4.86	5.76	6.89	8.16	9.47	CU.YDS.CONC. 2 HEADWALLS
LBS.STEEL 2 HEADWALLS	274	314	393	440	521	610	681	LBS.STEEL 2 HEADWALLS

DIMENSIONS AND QUANTITIES ARE BASED ON CONCRETE PIPE AND WILL VARY SLIGHTLY FOR CORRUGATED METAL PIPE.

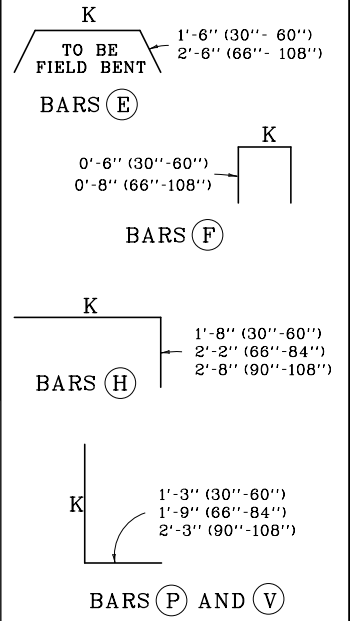
USE WITH SHEET 2 OF 6

REVISIONS	DATE	DIMENSIONS & QUANTITIES 30"-66" HEADWALLS NON-CIRCULAR PIPE 0° SKEW CHK. BY: EJP EFFECTIVE DATE: 1-1-2010 BUTLER COUNTY ENGINEERS OFFICE AND OPERATIONS FACILITY 1921 FARGROVE AVENUE · HAMILTON, OHIO PHONE 867-5744 45011
SHEET		4 OF 6

MARK	SIZE	NO				K				MARK	SIZE	NO				K				MARK	SIZE	NO				K														
		①	FT	IN	FT	IN	①	FT	IN			FT	IN	①	FT	IN	FT	IN	①			FT	IN	FT	IN	①	FT	IN	FT	IN										
30''								42''								54''								66''																
A	5	4	4	8					A	5	4	6	2					A	5	4	7	7					A	5	4	9	4									
C1	4	2	2	4					C1	4	2	2	9					C1	4	2	0	11				B1	5	8	2	10										
C2	4	2	4	2					C2	4	2	4	9					C2	4	2	3	0				B2	5	8	3	10										
E1	5	2	6	4	3	4			C3	4	2	5	6					C3	4	2	5	1				B3	5	8	4	9										
E2	5	2	6	8	3	8			E1	5	2	7	6	4	6			C4	4	4	6	10				B4	5	8	5	9										
F	4	3	1	3	0	4			E2	5	2	7	10	4	10			E1	5	2	8	8	5	8		C1	4	4	1	5										
G1	4	2	3	10					F	4	4	1	3	0	4			E2	5	2	9	0	6	0		C2	4	4	3	5										
G2	4	3	6	2					G1	4	3	6	4					F	4	6	1	3	0	4		C3	4	4	5	6										
H	4	4	5	1	3	5			G2	4	3	8	7					G1	4	1	5	3				C4	4	4	7	7										
N	4	6	4	2					H	4	5	6	3	4	7			G2	4	3	8	9				C5	4	8	8	4										
Q	4	2	2	9					N	4	6	5	6					G3	4	3	11	0				E1	5	2	11	9	6	10								
R	4	3	0	8					Q	4	2	3	11					H	4	6	7	5	5	9		E2	5	2	12	3	7	4								
V1	5	4	3	1	1	10			R	4	4	0	9					N	4	6	6	10				F	4	7	1	9	0	6								
V2	5	4	4	1	2	10			V1	5	4	3	6	2	3			Q	4	2	5	1				G1	4	3	8	0										
									V2	5	4	4	6	3	3			R	4	6	0	10				G2	4	3	11	4										
									V3	5	4	5	6	4	3			V1	5	4	4	0	2	9		G3	4	3	13	10										
																	V2	5	4	5	0	3	9		H	4	7	9	3	7	1									
36''																	V3	5	4	6	0	4	9		M	4	16	3	9											
																	V4	5	2	7	0	5	9		N	4	14	8	4											
A	5	4	5	5					48''													P	5	16	5	0	3	3												
C1	4	2	1	7					A	5	4	6	11						Q	5	3	6	2			Q	5	3	6	2										
C2	4	2	3	8					C1	4	2	1	10						R	5	7	2	7			R	5	7	2	7										
C3	4	2	4	10					C2	4	2	3	10					60''																						
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F	4	4	1	3	0	4			E1	5	2	8	1	5	1			C3	4	2	6	3				C3	4	2	6	3										
G1	4	3	5	0					E2	5	2	8	5	5	5			C4	4	4	7	7				C4	4	4	7	7										
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R	4	4	0	8					H	4	6	6	10	5	2				H	4	7	8	0	6	4		G3	4	3	12	4									
V1	5	4	3	4	2	1			N	4	6	6	2						N	4	6	7	7				H	4	7	8	0	6	4							
V2	5	4	4	4	3	1			Q	4	2	4	6						Q	4	2	5	8				N	4	6	7	7									
V3	5	2	5	4	4	1			R	4	5	0	9						R	4	6	0	10				Q	4	2	5	8									
									R	4	5	0	9							R	4	6	0	10				R	4	6	0	10								
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									V3	5	4	5	9	4	6					V3	5	4	6	2	4	11		V3	5	4	6	2	4	11						
																				V4	5	4	7	2	5	11		V4	5	4	7	2	5	11						

NOTES
 ① NUMBER OF BARS IN ONE HEADWALL.
 2 DIMENSIONS ARE 0. TO 0. OF BARS.
 3 ALL BARS ARE STRAIGHT EXCEPT THOSE SHOWN BELOW.

BENT BAR SHAPES



USE WITH SHEET 2 OF 6

REVISIONS	DATE

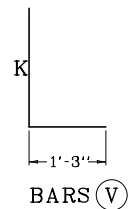
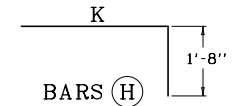
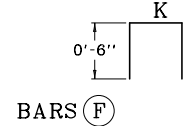
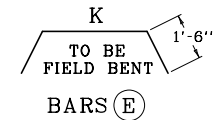
BILL OF REINFORCEMENT
 30" TO 66" DIAMETER
 CIRCULAR PIPE HEADWALLS
 0° SKEW
 CHK. BY: EJP EFFECTIVE DATE: 1-1-2010
 BUTLER COUNTY ENGINEERS OFFICE
 AND OPERATIONS FACILITY
 1921 FAIRGROVE AVENUE - HAMILTON, OHIO 45011
 PHONE 867-5744

MARK	SIZE	NO		LGTH		K		MARK	SIZE	NO		LGTH		K		MARK	SIZE	NO		LGTH		K	
		①		FT	IN	FT	IN			①		FT	IN	FT	IN			①		FT	IN	FT	IN
30''								42'' (CONTINUED)								60''							
A	5	4	4	1				Q	4	2	4	11			A	5	4	7	2				
C1	4	2	1	5				R	4	5	0	9			C1	4	2	2	2				
C2	4	2	3	5				V1	5	4	3	3	2	0	C2	4	2	4	3				
E1	5	2	7	0	4	0		V2	5	4	4	3	3	0	C3	4	2	6	4				
E2	5	2	7	5	4	5		V3	5	2	5	3	4	0	C4	4	2	6	6				
F	4	4	1	3	0	4									E1	5	2	10	7	7	7		
G1	4	2	4	0											E2	5	2	11	0	8	0		
G2	4	3	6	4				48''								F	4	8	1	3	0	4	
H	4	4	4	10	3	2		A	5	4	5	11			G1	4	2	8	1				
N	4	6	3	8				C1	4	2	2	4			G2	4	2	10	4				
Q	4	2	3	5				C2	4	2	4	4			G3	4	3	12	8				
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V2	5	4	3	11	2	8		E2	5	2	9	6	6	6	Q	4	2	7	1				
								F	4	7	1	3	0	4	R	4	7	0	10				
								G1	4	1	5	4			V1	5	4	3	10	2	7		
36''								G2	4	2	7	8			V2	5	4	4	10	3	7		
A	5	4	4	9				G3	4	3	9	11			V3	5	4	5	9	4	6		
C1	4	2	2	7				H	4	6	6	3	4	7	V4	5	2	6	9	5	6		
C2	4	2	4	3				N	4	6	5	4											
E1	5	2	7	8	4	8		Q	4	2	5	7											
E2	5	2	8	1	5	1		R	4	6	0	10			66''								
F	4	5	1	3	0	4		V1	5	4	3	5	2	2	A	5	4	7	9				
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H	4	4	5	4	3	8									C3	4	4	7	1				
N	4	6	4	3				54''								E1	5	2	11	3	8	3	
Q	4	2	4	2				A	5	4	6	6			E2	5	2	11	8	8	8		
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V1	5	4	3	1	1	10		C2	4	2	3	2			G1	4	1	7	0				
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								C4	4	2	5	3			G3	4	2	11	8				
								E1	5	2	9	10	6	10	G4	4	3	13	11				
42''								E2	5	2	10	1	7	1	H	4	7	7	9	6	1		
A	5	4	5	5				F	4	7	1	3	0	4	N	4	6	7	1				
C1	4	2	1	7				G1	4	2	6	9			Q	4	3	7	9				
C2	4	2	3	7				G2	4	2	9	0			R	4	8	0	11				
C3	4	2	4	10				G3	4	3	11	4			V1	5	4	4	1	2	10		
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F	4	6	1	3	0	4		Q	4	2	6	4			V4	5	2	6	11	5	8		
G1	4	1	4	5				R	4	7	0	10											
G2	4	2	6	7				V1	5	4	3	8	2	5									
G3	4	3	8	11				V2	5	4	4	8	3	5									
H	4	5	5	10	4	2		V3	5	4	5	7	4	4									
N	4	6	4	10																			

NOTES

- ① NUMBER OF BARS IN ONE HEADWALL.
- 2 DIMENSIONS ARE 0. TO 0. OF BARS.
- 3 ALL BARS ARE STRAIGHT EXCEPT THOSE SHOWN BELOW.

BENT BAR SHAPES



USE WITH SHEET 2 OF 6

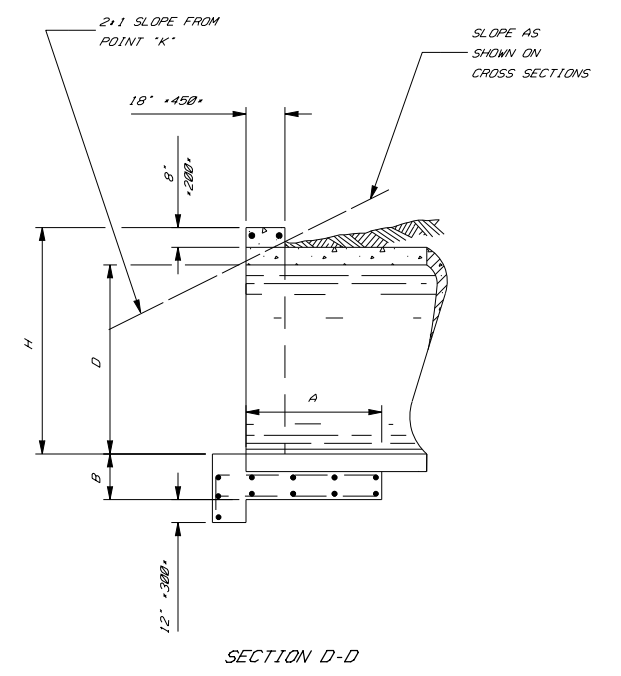
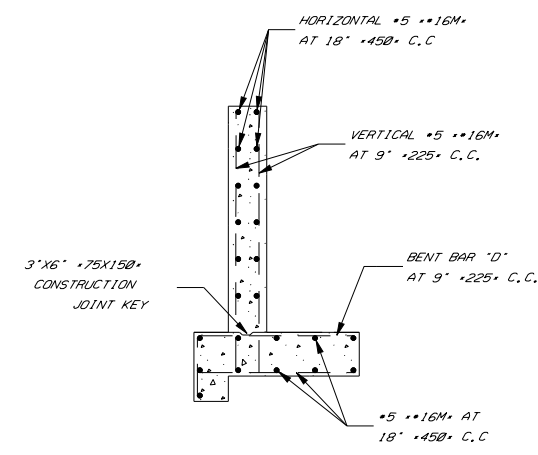
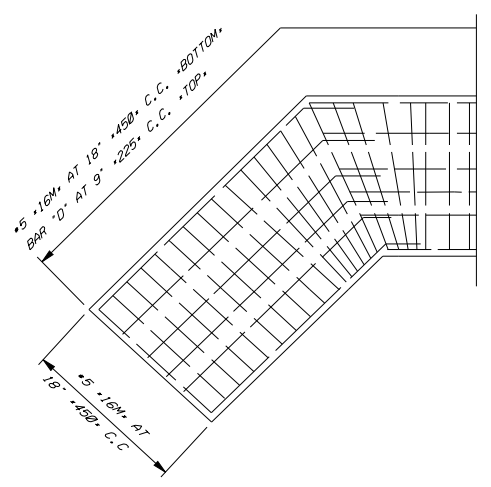
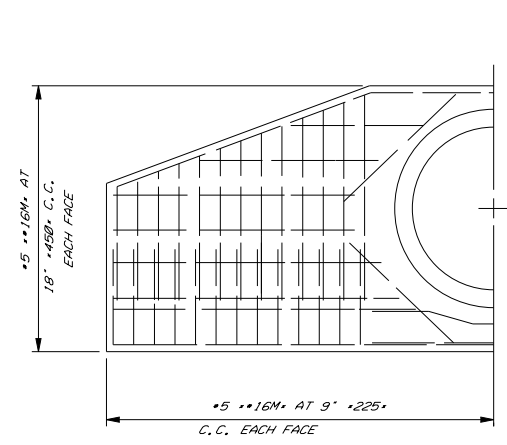
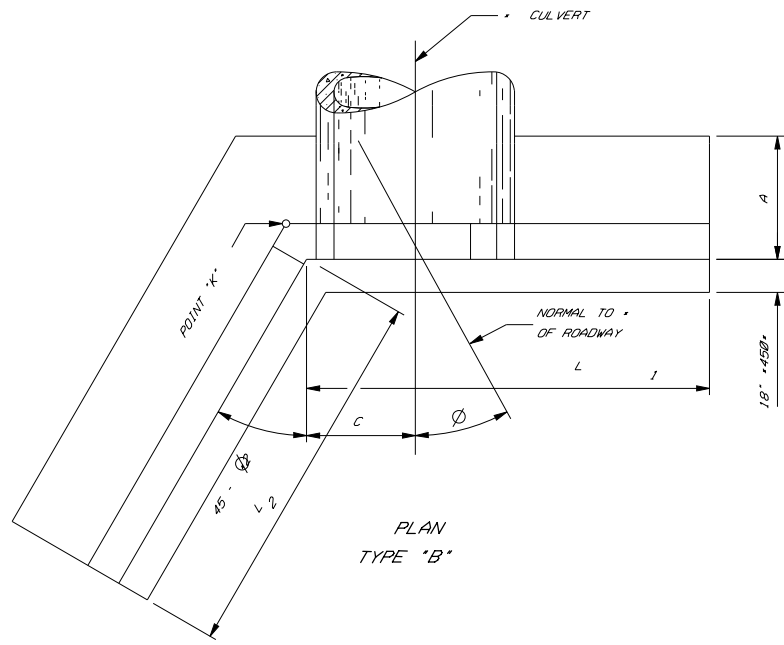
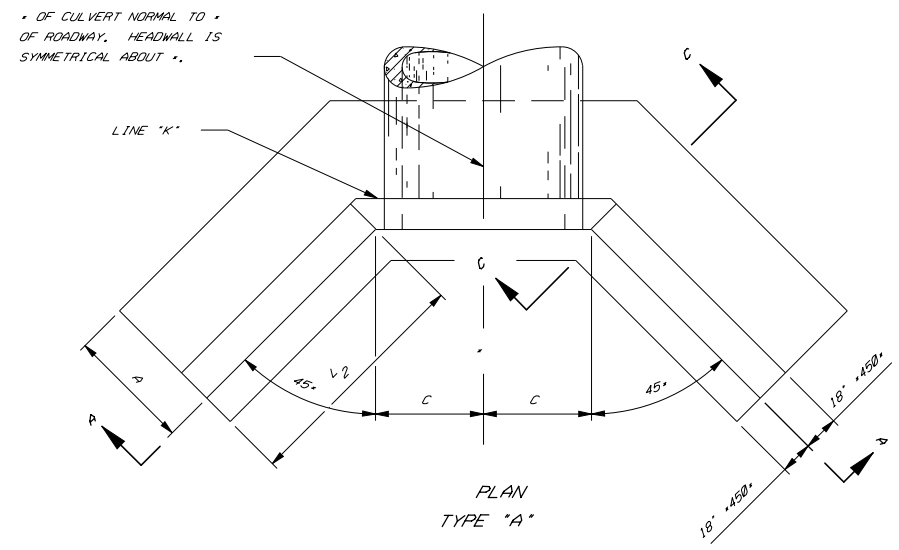
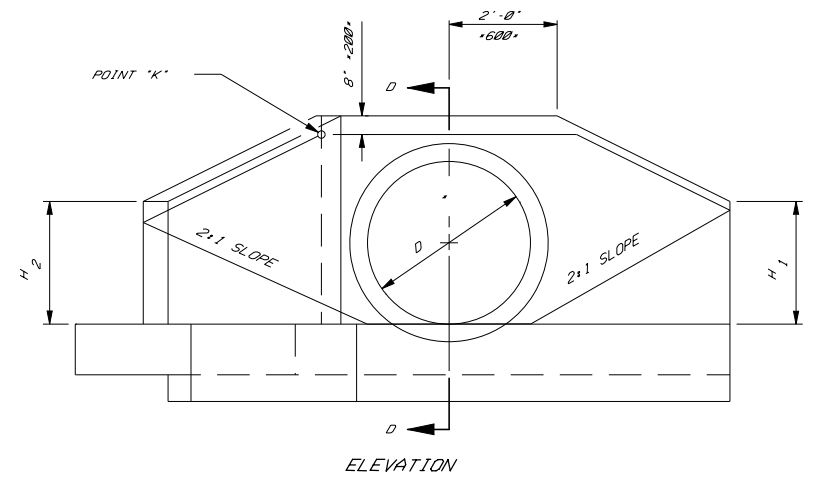
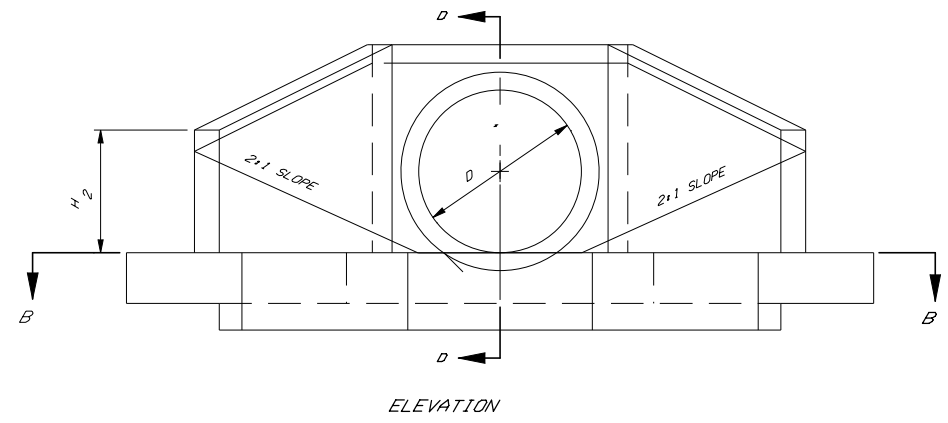
REVISIONS	DATE	

BILL OF REINFORCEMENT
30" TO 66"
NON-CIRCULAR PIPE HEADWALLS
0° SKEW
CHK. BY: EJP EFFECTIVE DATE: 1-1-2010

BUTLER COUNTY ENGINEERS OFFICE
AND OPERATIONS FACILITY

1921 FARGROVE AVENUE - HAMILTON, OHIO
PHONE 867-5744

SHEET	6 OF 6
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NOTES

APPLICATION: FULL HEIGHT HEADWALLS SHALL BE PROVIDED FOR SKEWED AND NON-SKEWED CULVERTS HAVING A DIAMETER OR RISE OF 42" TO 84" INCLUSIVE. TYPE "A" IS USED WHEN THE SKEW ANGLE IS TEN DEGREES OR LESS AND TYPE "B" WHEN THE SKEW ANGLE IS OVER TEN DEGREES.

CONCRETE: CONCRETE SHALL BE CLASS C.

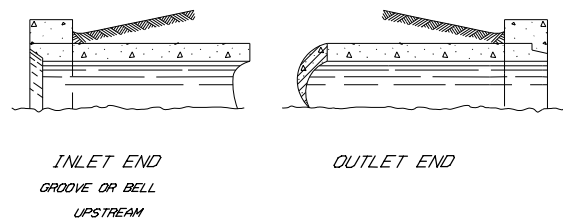
REINFORCING STEEL: BARS SHALL BE #5 #16M AND EPOXY COATED.

DETAILS AND QUANTITIES: ARE SHOWN FOR CIRCULAR SECTIONS ONLY. WHEN USED WITH REINFORCED ELLIPTICAL CONCRETE PIPE OR CORRUGATED METAL PIPE ARCHES, IT WILL BE NECESSARY TO ADJUST DIMENSIONS AND QUANTITIES TO CONFORM TO THOSE LISTED FOR THE NEAREST SIZE CIRCULAR PIPE. THE DIMENSIONS ESTABLISHED BY VERTICAL DIAMETER SHALL APPLY TO SPAN. ALL CALCULATED DIMENSIONS ESTABLISHED BY HORIZONTAL DIAMETER SHALL BE ROUNDED TO THE NEAREST 1" .25". CHAMFER ALL EXPOSED CORNERS 1/4" .19".

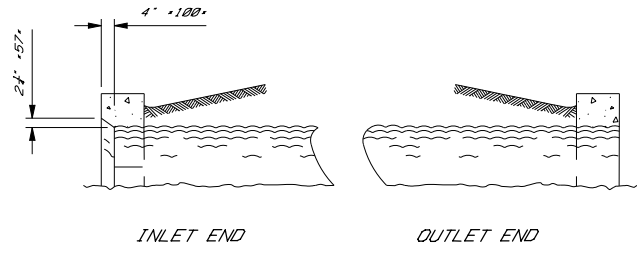
FOUNDATION: WHERE THE SOIL BORINGS INDICATE A BEARING CAPACITY OF LESS THAN 2,600 POUNDS PER SQUARE FOOT .125 KPA., IT WILL BE NECESSARY TO INCREASE THE WIDTH OF THE FOOTING.

HEADWALL LOCATION: TO BE DETERMINED BY THE INTERSECTION OF THE EMBANKMENT SLOPE AT THE BACK OF THE HEADWALL AT POINT "K". THE SLOPES ADJACENT TO THE HEADWALL SHALL BE 2:1.

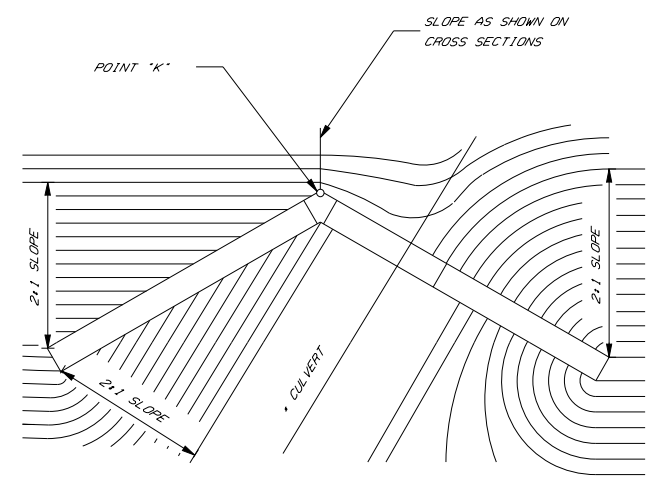
PAYMENT: ITEM 602 CONCRETE MASONRY INCLUDES REINFORCING.



RIGID PIPE



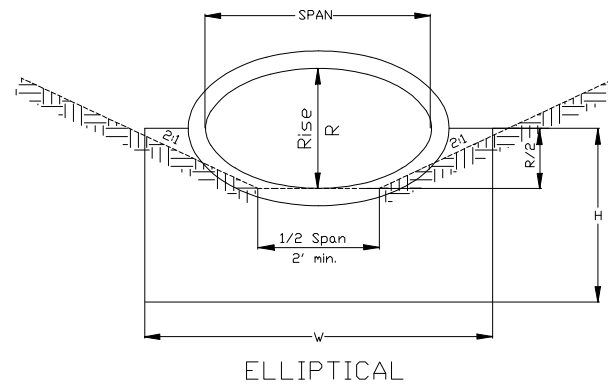
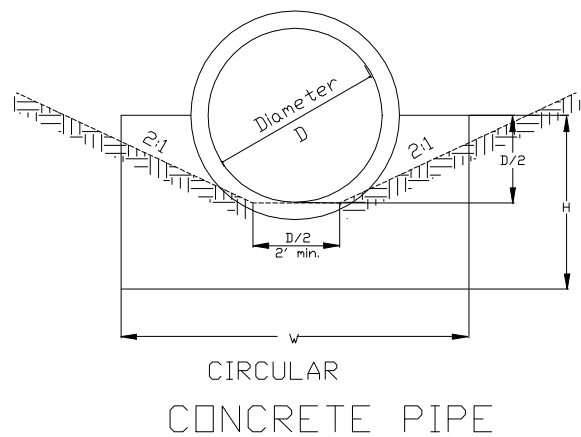
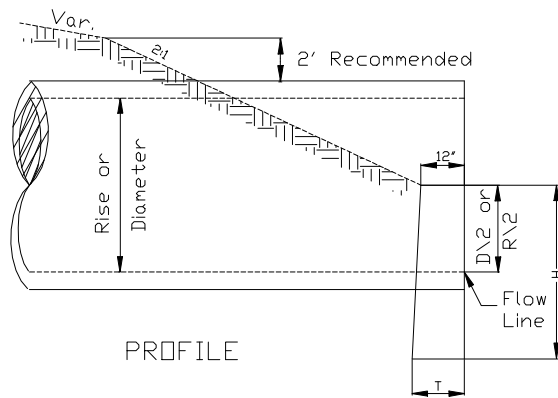
CORRUGATED PIPE
END TREATMENT OF HEADWALL



LOCATION AND GRADING PLAN FOR
SKEWED PIPE CULVERT - TYPE B

FULL-HEIGHT HEADWALLS *ENGLISH*

PIPE DIA, D	H	A	B	C	BAR# D	$\phi \approx 10$			$\phi \approx 15$			$\phi \approx 30$			$\phi \approx 45$			PIPE DIA, D														
						L ₂	H ₂	CONC. CMP *CY*	CONC. RCP *CY*	STEEL *LBS.*	L ₁	L ₂	H ₁	H ₂	CONC. CMP *CY*	CONC. RCP *CY*	STEEL *LBS.*		L ₁	L ₂	H ₁	H ₂	CONC. CMP *CY*	CONC. RCP *CY*	STEEL *LBS.*							
72"	7'-7"	4'-6"	1'-7"	3'-9"	*7	7'-5"	4'-5"	17.0	16.2	1,783	15'-1"	8'-11"	5'-7"	4'-6"	17.8	17.1	1,811	12'-5"	11'-2"	4'-3"	4'-7"	17.3	16.6	1,788	12'-5"	14'-10"	4'-3"	4'-8"	20.2	19.6	2,076	72"
84"	8'-8"	5'-0"	1'-10"	4'-3"	*8	9'-0"	5'-0"	23.7	22.8	2,595	17'-7"	10'-9"	6'-4"	5'-1"	24.8	23.9	2,596	14'-7"	13'-4"	4'-10"	5'-2"	24.1	23.3	2,511	14'-3"	17'-8"	4'-8"	5'-2"	27.9	27.0	2,990	84"



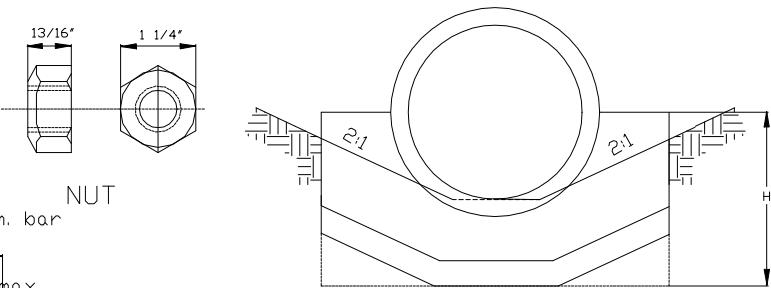
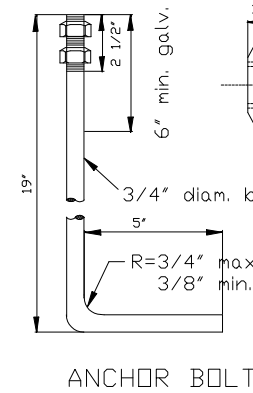
NOTES

CONCRETE for headwalls shall be Class C.

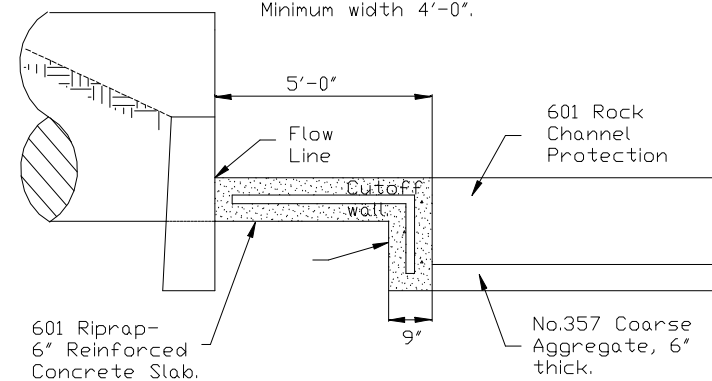
ANCHOR BOLTS (as detailed) for anchoring upstream end of metal pipes shall meet ASTM A307. The top 6" min. of bolt shall be galvanized according to ASTM A153. Nuts (as detailed) shall meet ASTM A325 and A153. Cost of anchors shall be included in the unit price bid per linear foot of 603 Conduit. Unless otherwise specified, anchor bolts shall be used only on pipe with span or rise greater than 24 inches.

HEADWALL FOR CONCRETE PIPE										
CIRCULAR					ELLIPTICAL					
D	W	H	T	Conc. C.Y.	Span	Rise	W	H	T	Conc. C.Y.
12"	2'-0"	3'-0"	12"	.20						
15"	2'-6"	3'-2"	12"	.25						
18"	3'-0"	3'-3"	12"	.31	23'	14'	3'-5"	3'-2"	12"	.33
21"	3'-6"	3'-4"	12"	.37						
24"	4'-0"	3'-6"	12"	.43	30'	19'	4'-2"	3'-4"	12"	.42
27"	4'-6"	3'-8"	12"	.49	34'	22'	4'-7"	3'-5"	12"	.46
30"	5'-0"	3'-9"	12"	.56	38'	24'	5'-0"	3'-6"	12"	.50
33"	5'-6"	3'-10"	12"	.62	42'	27'	5'-5"	3'-7"	12"	.55
36"	6'-0"	4'-0"	12"	.69	45'	29'	5'-10"	3'-8"	12"	.59
39"	6'-6"	4'-2"	12"	.77	49'	32'	6'-6"	3'-10"	12"	.67
42"	7'-0"	4'-3"	12"	.84	53'	34'	7'-2"	4'-0"	14"	.82
48"	8'-0"	4'-6"	14"	1.09	60'	38'	8'-5"	4'-2"	14"	1.01
54"	9'-3"	4'-9"	14"	1.32	68'	43'	9'-8"	4'-4"	16"	1.32
60"	10'-6"	5'-6"	16"	1.93	76'	48'	11'-0"	5'-0"	16"	1.79
66"	11'-9"	5'-9"	18"	2.42	83'	53'	12'-4"	5'-2"	18"	2.23
72"	13'-0"	6'-0"	18"	2.77	91'	58'	13'-7"	5'-5"	18"	2.53
78"	14'-3"	6'-3"	20"	3.37	98'	63'	14'-10"	5'-7"	20"	3.07
84"	15'-6"	6'-6"	22"	4.05	106'	68'	16'-2"	5'-10"	20"	3.42
90"	16'-9"	6'-9"	22"	4.51	113'	72'	17'-6"	6'-0"	22"	4.05
96"	18'-0"	7'-0"	24"	5.31						
102"	19'-3"	7'-3"	26"	6.20						
108"	20'-6"	7'-6"	26"	6.78						
114"	21'-9"	7'-9"	28"	7.81						
120"	23'-0"	8'-0"	30"	8.93						

HEADWALL FOR CORRUGATED METAL PIPE											
CIRCULAR					PIPE ARCH						
D	W	H	T	Conc. C.Y.	Span	Rise	W	H	T	Conc. C.Y.	
12"	2'-0"	3'-0"	12"	.21							
15"	2'-6"	3'-2"	12"	.27	18'	11'	3'-0"	3'-0"	12"	.31	
18"	3'-0"	3'-3"	12"	.33	22'	13'	3'-6"	3'-0"	12"	.37	
21"	3'-6"	3'-4"	12"	.39	25'	16'	4'-0"	3'-2"	12"	.43	
24"	4'-0"	3'-6"	12"	.46	29'	18'	4'-6"	3'-3"	12"	.48	
27"	4'-6"	3'-8"	12"	.53							
30"	5'-0"	3'-9"	12"	.60	36'	22'	5'-6"	3'-5"	12"	.61	
33"	5'-6"	3'-10"	12"	.68							
36"	6'-0"	4'-0"	12"	.76	43'	27'	6'-6"	3'-7"	12"	.74	
39"	6'-6"	4'-2"	12"	.84							
42"	7'-0"	4'-3"	12"	.92	50'	31'	7'-8"	3'-9"	12"	.90	
48"	8'-0"	4'-6"	12"	1.10	58'	36'	9'-0"	4'-0"	12"	1.09	
54"	9'-3"	4'-9"	12"	1.33	65'	40'	10'-0"	4'-2"	12"	1.25	
60"	10'-6"	5'-6"	12"	1.78	72'	44'	11'-0"	4'-4"	12"	1.43	
66"	11'-9"	5'-9"	12"	2.06	73'	55'	13'-0"	4'-9"	12"	1.84	
72"	13'-0"	6'-0"	12"	2.37	87'	63'	15'-6"	5'-2"	14"	2.56	
78"	14'-3"	6'-3"	14"	2.94	103'	71'	18'-6"	5'-6"	16"	3.50	
84"	15'-6"	6'-6"	14"	3.30	114'	77'	20'-0"	5'-9"	18"	4.18	
90"	16'-9"	6'-9"	16"	4.00							
96"	18'-0"	7'-0"	16"	4.40							
102"	19'-3"	7'-3"	18"	5.28							
108"	20'-6"	7'-6"	20"	6.21							
114"	21'-9"	7'-9"	22"	7.25							
120"	23'-0"	8'-0"	24"	8.38							

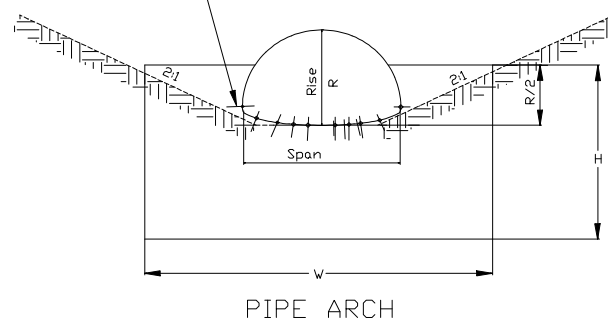
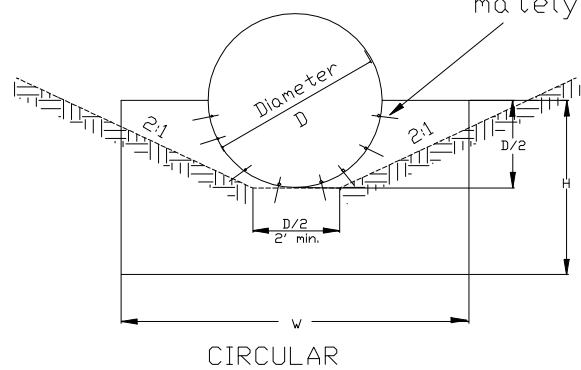
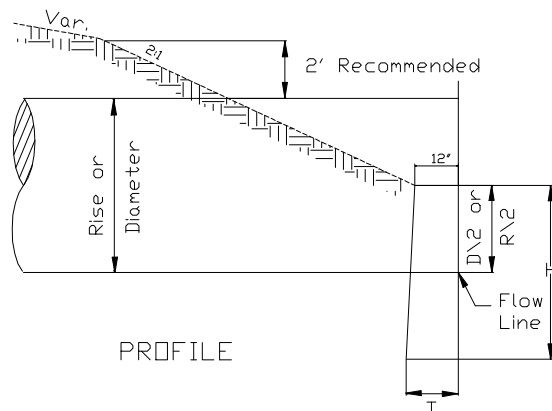


Width of protection shall equal width of headwall. Minimum width 4'-0".



CHANNEL PROTECTION DETAIL

Cutoff wall depth (2'-6" min.) is variable to match required thickness of rock.



Anchor bolts at approximately 1'-6" centers.

CORRUGATED METAL PIPE

REVISIONS	DATE

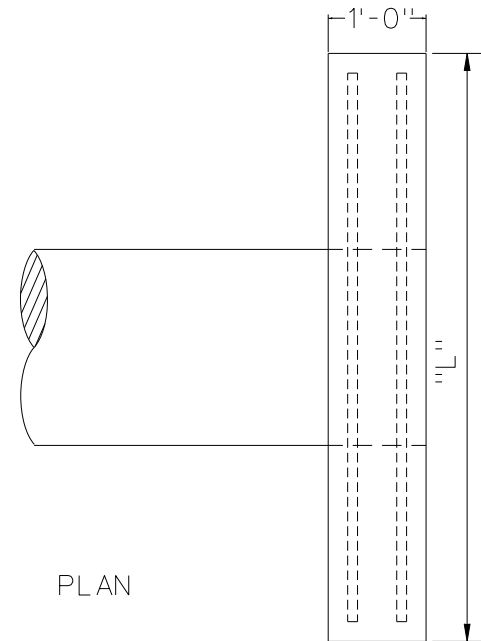
HEADWALLS
HW-4

CHK. BY: C.A.H. EFFECTIVE DATE: 1-1-94

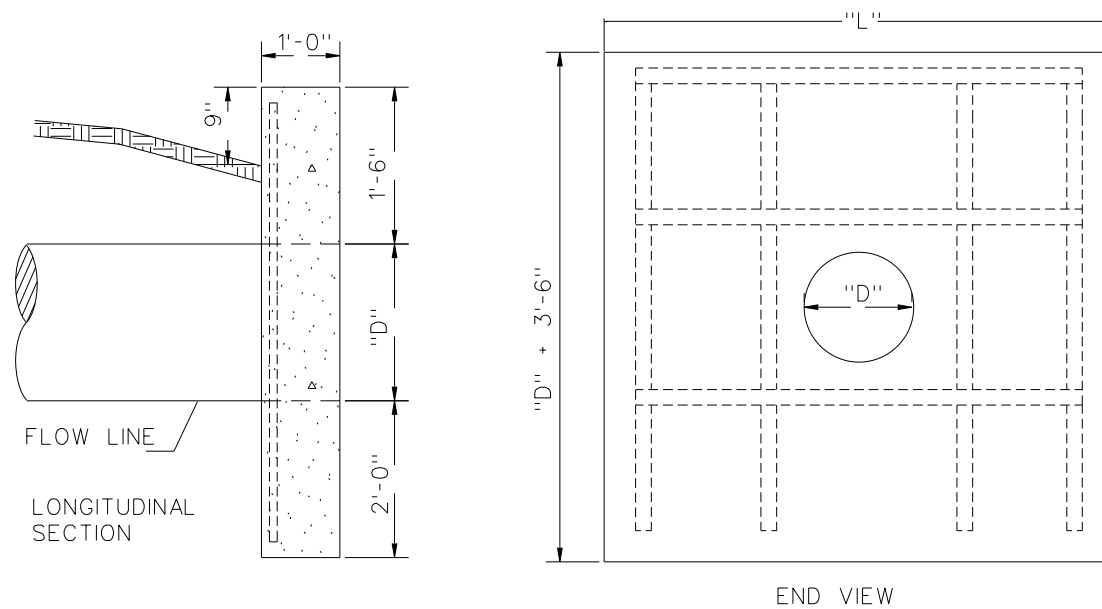
BUTLER COUNTY ENGINEERS OFFICE
AND OPERATIONS FACILITY
1921 FAIRGROVE AVENUE - HAMILTON, OHIO
PHONE 867-5744 45011

STANDARD

D DIAM OF PIPE	L LENGTH HEAD WALL	QUANTITIES IN TWO HEADWALLS						
		A BARS		B BARS			REINF.	PLAIN
		NO.	LENGTH	NO.	LENGTH	LBS.	C.Y.	C.Y.
12"	4'-0"	8	4'-0"	8	3'-6"	40	1.3	2.1
15"	5'-0"	8	4'-3"	8	4'-6"	47	1.7	2.7
18"	5'-9"	8	4'-6"	8	5'-3"	52	2.0	3.3
21"	6'-9"	8	4'-9"	8	6'-3"	59	2.4	4.0
24"	7'-6"	8	5'-0"	8	7'-0"	64	2.8	4.6
27"	8'-6"	8	5'-3"	8	8'-0"	71	3.3	5.5
30"	9'-3"	8	5'-6"	8	8'-9"	76	3.8	6.2
33"	10'-3"	8	5'-9"	8	9'-9"	83	4.3	7.2
36"	11'-0"	8	6'-0"	8	10'-6"	88	4.8	8.0



HEADWALLS FOR PIPES
HAVING A DIAMETER GREATER THAN 36 INCHES
SHALL BE DESIGNED AS A CANTILEVER OR
GRAVITY TYPE WALL.



REINFORCED CONCRETE HEADWALL

REVISIONS	DATE	C-15	STANDARD HEADWALLS PIPE SIZE 12" - 36"

CHK. BY: EJP EFFECTIVE DATE: 1-1-2010

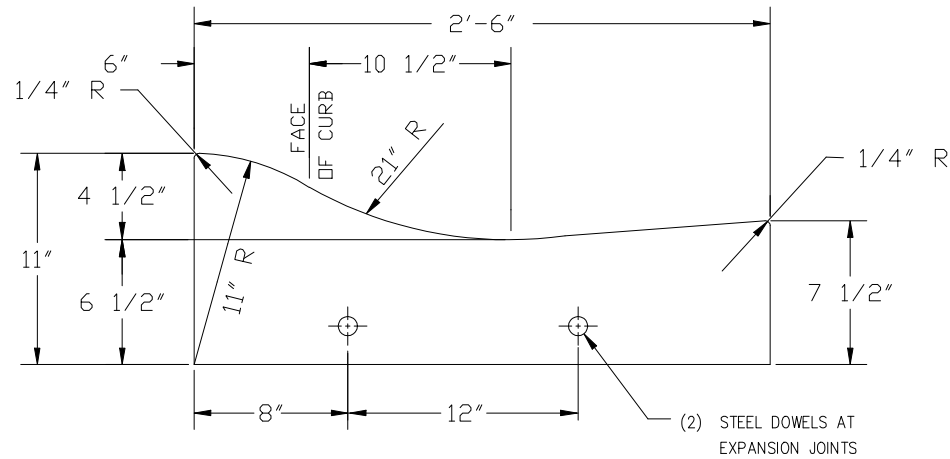
BUTLER COUNTY ENGINEERS OFFICE
AND OPERATIONS FACILITY

1921 FAIRGROVE AVENUE - HAMILTON, OHIO
PHONE 867-5744 45011

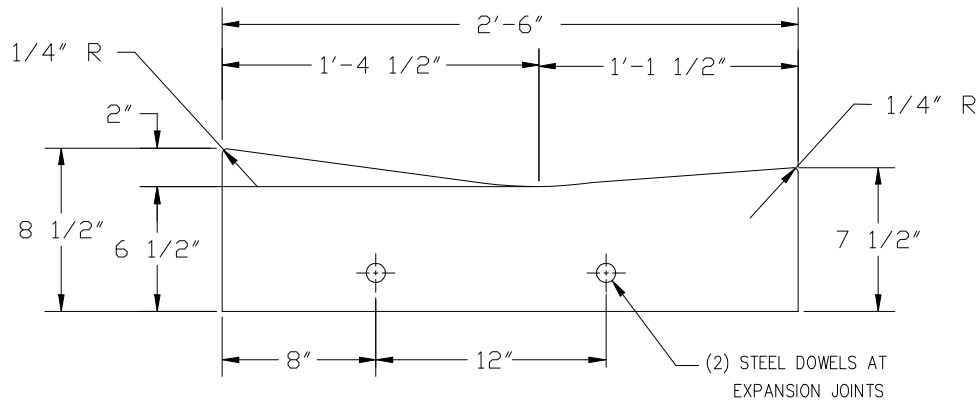
NOTES

GENERAL: This drawing shows the standard type of curb that should be used on most types of pavement. Typical section of project shows the type to be used, also the thickness of the edge of the pavement or the edge of the curb and gutter section.

JOINTS: One inch expansion joints shall extend up to top of the curb and shall be constructed in the curb and gutter section in such a manner that the joint seal will extend the full width of the gutter and into the curb face a sufficient distance to seal the joint to an elevation of at least two (2) inches above the flow line of the gutter section at expansion joints. All joints shall be constructed perpendicular to the edge of the curb and to the surface of the pavement. Transverse expansion joint material shall meet the requirements of 705.03. expansion material and joint sealer is not required when curb is adjacent to flexible type pavement.



STANDARD ROLL TYPE CURB & GUTTER
C-1

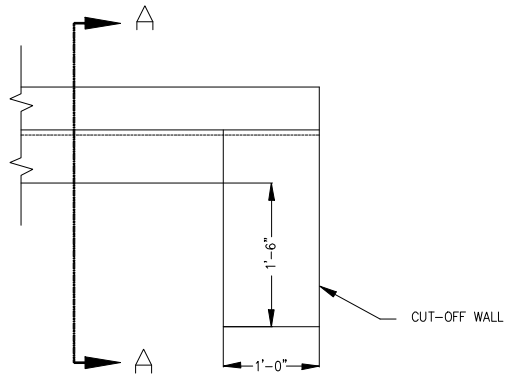


STANDARD DROP CURB AT DRIVEWAYS
ROLL TYPE C-1

REVISIONS	DATE	C-16

CURB AND GUTTER
 STANDARD C-1

 CHK. BY: C.A.H. EFFECTIVE DATE: 1-1-94
 BUTLER COUNTY ENGINEERS OFFICE
 AND OPERATIONS FACILITY
 1921 FAIRGROVE AVENUE - HAMILTON, OHIO
 PHONE 867-5744 45011

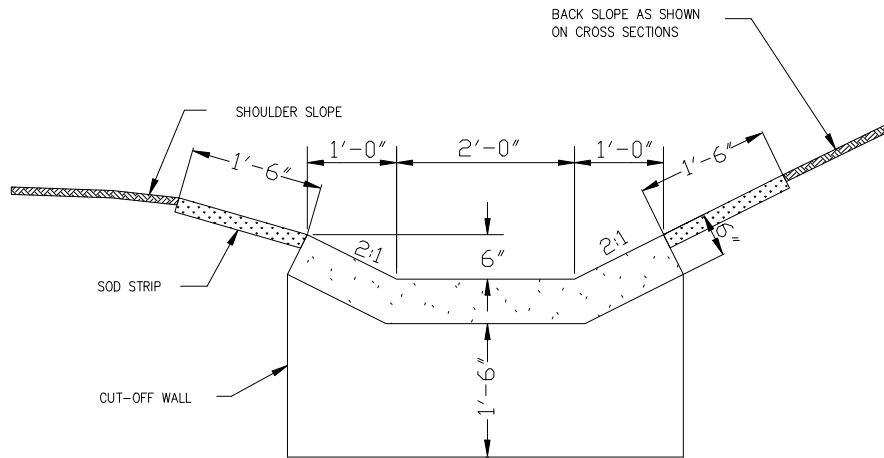


SIDE VIEW

NOTES

CONSTRUCTION: Gutters shall be constructed of class C concrete. Concrete gutters shall have impressed contraction joints spaced at intervals of 10 feet unless otherwise specified. Concrete cut-off walls shall be at the beginning and end of each run of the gutter except where the gutter connects with a catch basin or inlet. The cost of the cut-off walls is included in the unit price bid for gutter.

SOD: Installation and payment for sod shall be in accordance with item 660. Returning to normal 10 feet each side of the basin.



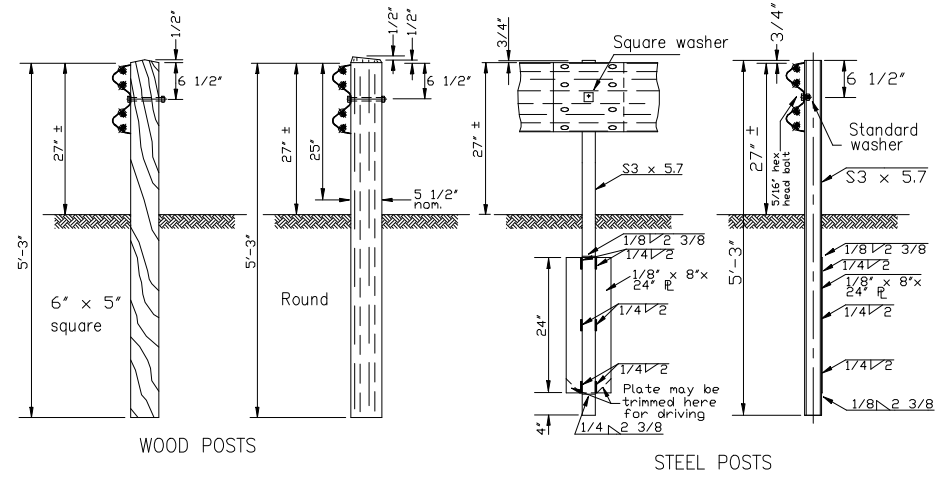
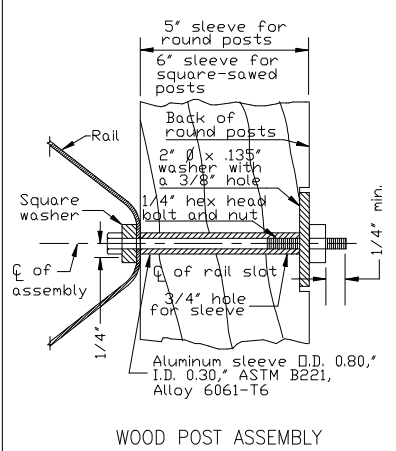
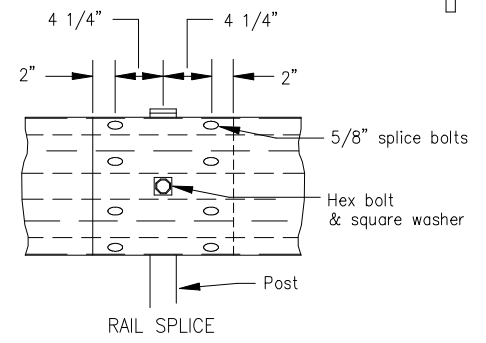
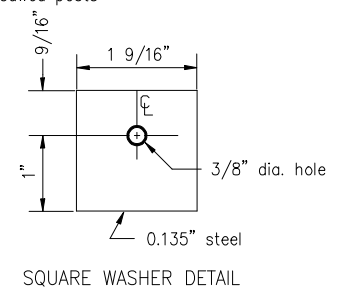
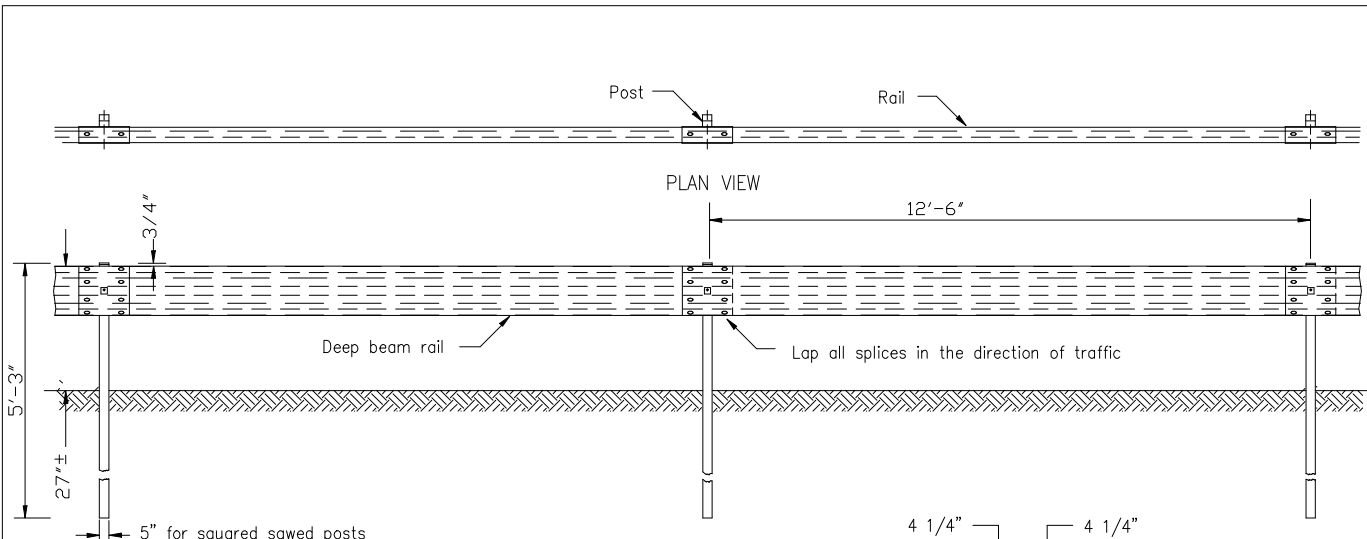
SECTION A-A

REVISIONS	DATE	

PAVED GUTTERS
TYPE 1-2

CHK. BY: C.A.H. EFFECTIVE DATE: 1-1-94

BUTLER COUNTY ENGINEERS OFFICE
AND OPERATIONS FACILITY
1921 FAIRGROVE AVENUE - HAMILTON, OHIO
PHONE 867-5744 45011



STEEL POSTS shall be S3x5.7 710.15 with a 1/8"x8"x24" steel plate welded to the back as shown, galvanized after fabrication. Post bolts shall be 5/16" by 1 3/4" hex head full body bolts, ASTM A-307, Grade A, with a minimum of 5/8" unthreaded. Provide a 1 9/16"x.135" square round steel washer between post and nut.

WOOD POSTS: Pressure treated wood 710.14 may be 5"x6" square sawed or 5 1/2" plus or minus 1/2" diameter round, measured at a point 25" below top of rail. Post bolts shall be 1/4" hex head full body bolts, ASTM A-307, Grade B. Provide a 1 9/16"x.135" round steel washer between post bolt and rail, and a 2"x.135" round steel washer between post bolt and nut. Aluminum pipe sleeve shall conform with ASTM B-221 Alloy 6061-T6.

POST SPACING ON CURVES shall be in accordance with the following:

Radius of Curvature	Post Spacing
220 feet and over	12'-6"
Between 110 feet and 220 feet	6'-3"
110 feet incl. to 75 feet	4'-2"
75 feet incl. to 50 feet incl.	3'-1 1/2"
Less than 50 feet	not recommended

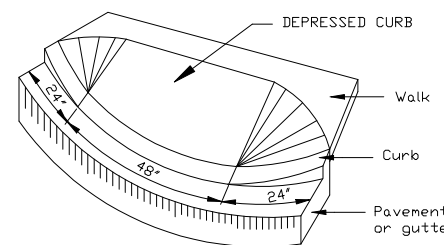
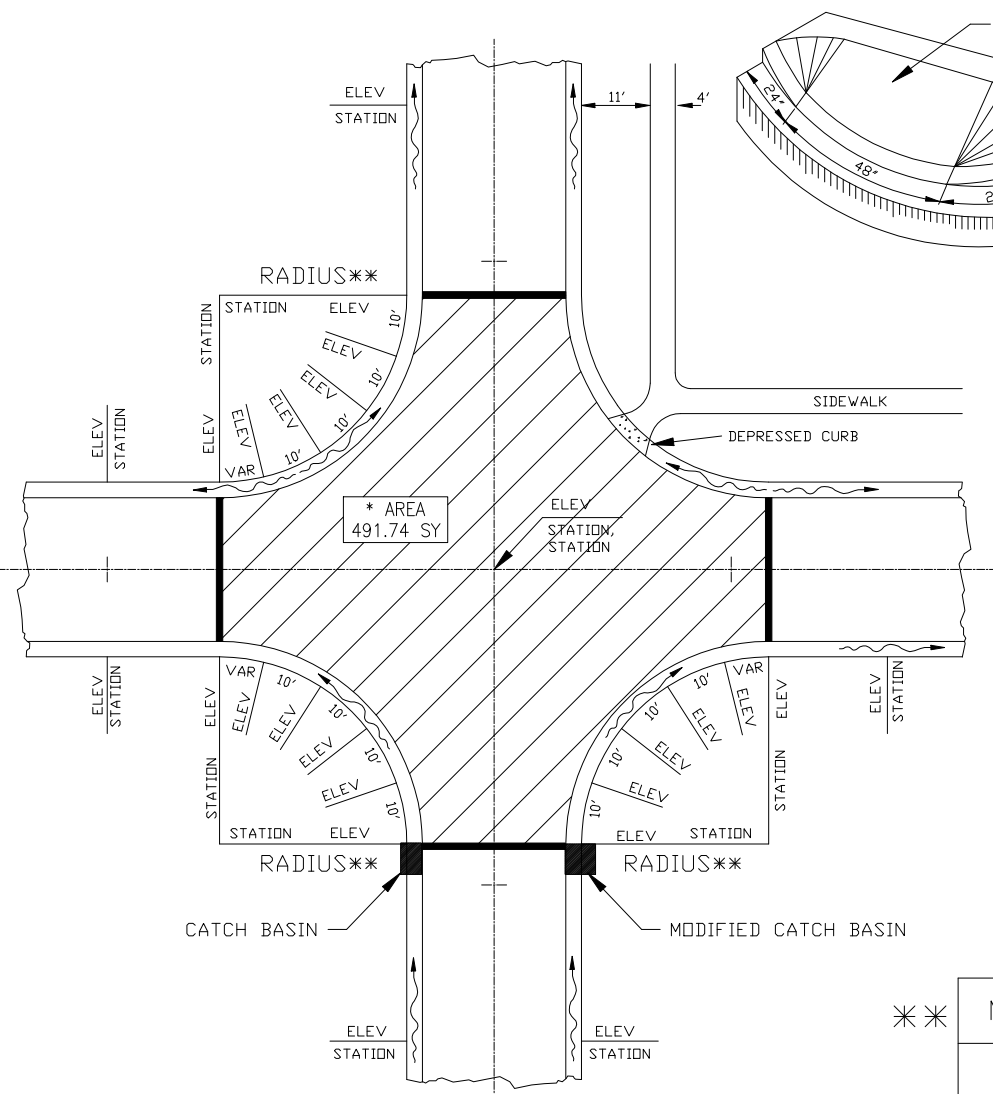
GUARD POSTS shall conform with the detail and requirements for Type 7 posts except that posts shall be spaced 6'-0" center to center unless otherwise shown on the plans, and shall be pressure treated with pentachlorophenol prior to painting. Guard posts shall be painted with one prime coat and two finish coats of white paint 708.05.

REVISIONS	DATE	C-18

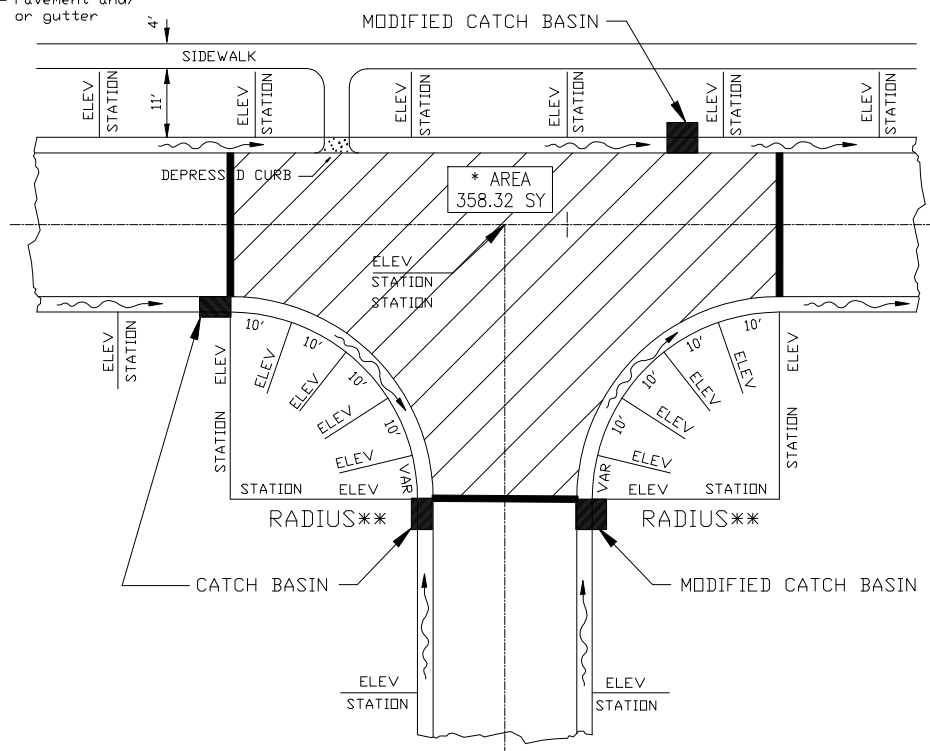
**GUARD RAIL
TYPE 7 GR-1**

CHK. BY: C.A.H. EFFECTIVE DATE: 1-1-94

BUTLER COUNTY ENGINEERS OFFICE
AND OPERATIONS FACILITY
1921 FAIRGROVE AVENUE - HAMILTON, OHIO
PHONE 867-5744 45011



NOTE: AREA WAS CALCULATED BY USING LOCAL STREET RADIUS OF 30' TO THE BACK OF CURB



* NOTE: THE HATCHED AREA WAS CALCULATED USING LOCAL STREET RADIUS OF 30' TO THE BACK OF CURB

NOTE: PAVEMENT ELEVATIONS TO BE PROVIDED AS REQUIRED BY THE COUNTY ENGINEERS OFFICE

**

STREET CLASSIFICATION	MINIMUM RADIUS	BACK OF CURB	RIGHT OF WAY
	INDUSTRIAL	50'	30'
MINOR ARTERIAL	50'	20'	20'
COLLECTOR	40'	20'	20'
LOCAL	30'	20'	20'

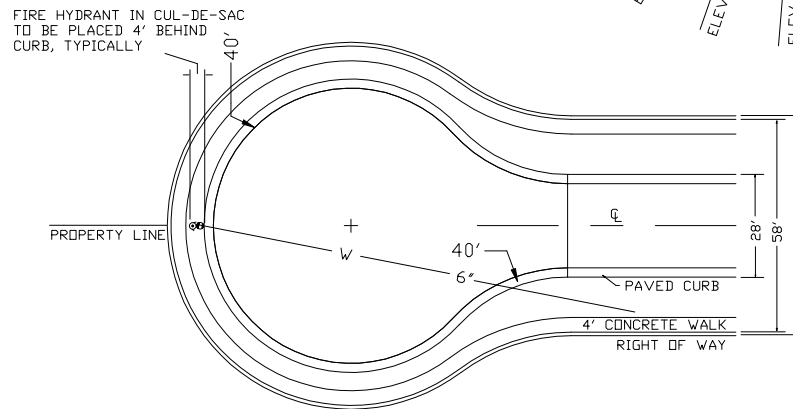
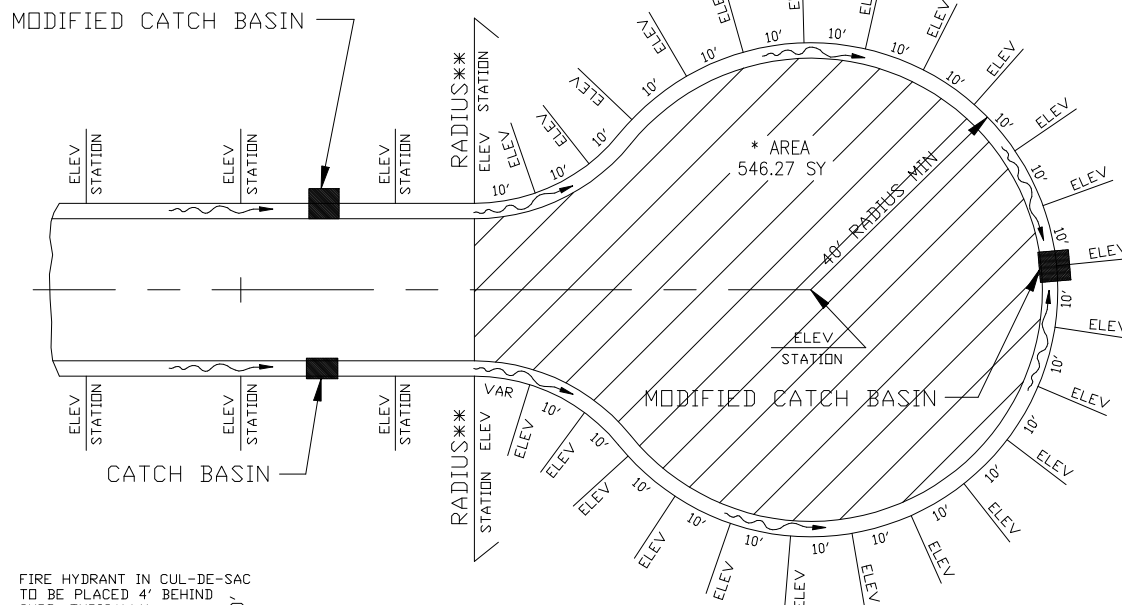
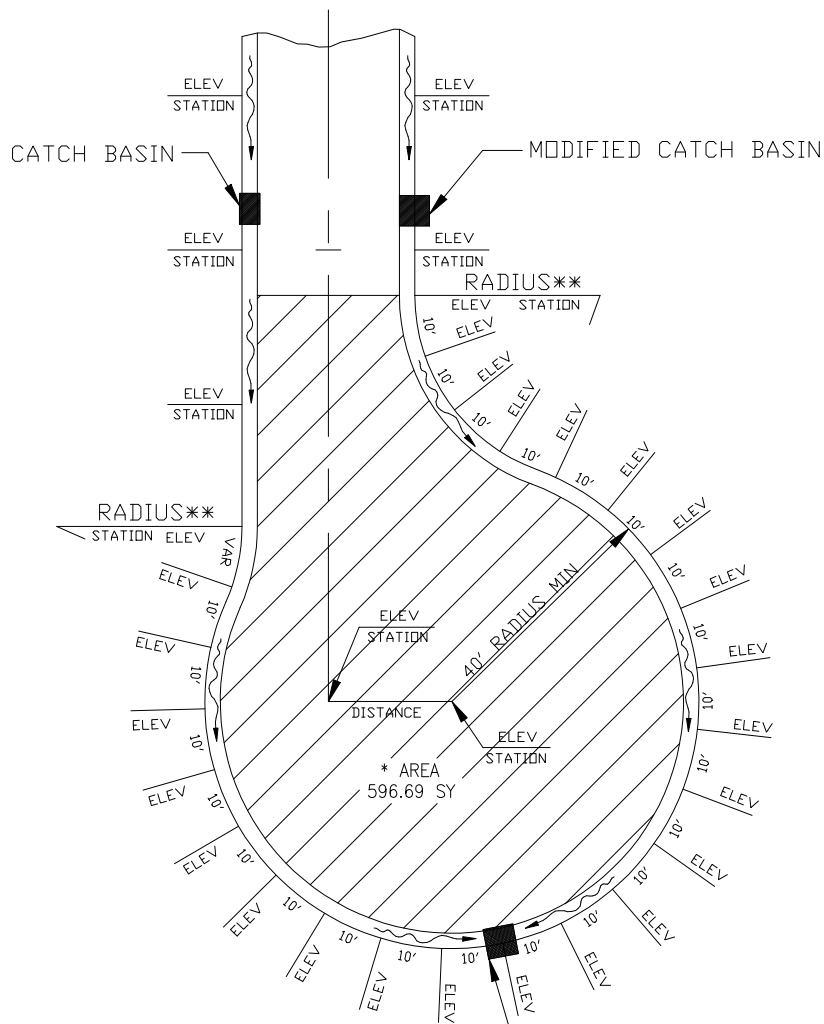
REVISIONS	DATE
INTERNAL REVIEW	7-10-92
R/W RADIUS	12-20-96
AREA CALCULATED	3-20-97

C-19

TYPICAL INTERSECTION DETAILS

CHK. BY: C.A.H. EFFECTIVE DATE: 1-1-94

BUTLER COUNTY ENGINEERS' OFFICE AND OPERATIONS FACILITY
1921 FAIRGROVE AVENUE - HAMILTON, OHIO
PHONE 867-5744 45011



**

MINIMUM RADIUS BACK OF CURB		
STREET CLASSIFICATION		
INDUSTRIAL	50'	
MINDR ARTERIAL	50'	
COLLECTOR	40'	
LOCAL	30'	

NOTE: THE HATCHED AREA WAS CALCULATED USING LOCAL STREET RADIUS OF 30' TO THE BACK OF CURB

NOTE: THE TYPICAL DISTANCE OF 20' FROM CENTERLINE OF THE STREET TO CENTER OF CUL-DE-SAC WAS USED WHN CALCULATING THE AREA

REVISIONS	DATE	C-20
R/W RADIUS	12-20-94	
AREA CAL.	3-20-97	

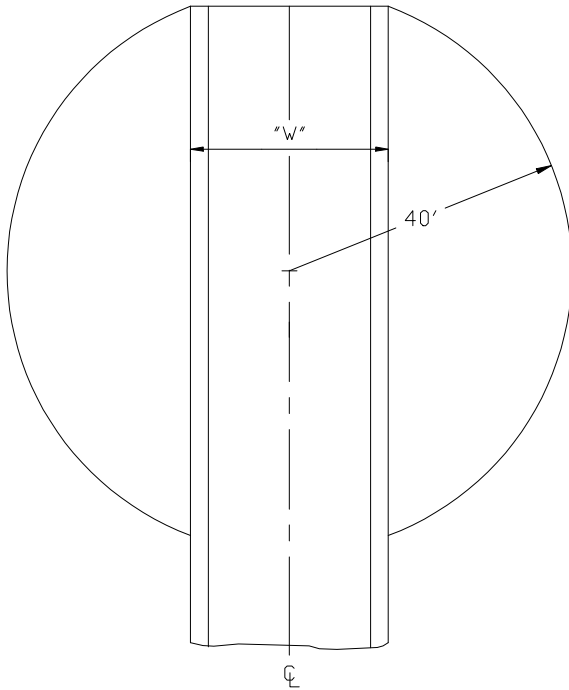
TYPICAL
CUL-DE-SAC
DETAILS

CHK. BY: C.A.H. EFFECTIVE DATE: 1-1-94

BUTLER COUNTY ENGINEERS OFFICE
AND OPERATIONS FACILITY
1921 FAIRGROVE AVENUE - HAMILTON, OHIO
PHONE 867-5744 4501

TEMPORARY TURNAROUNDS

STANDARD



STANDARD PAVEMENT

ASPHALT:
 RESIDENTIAL - 8" 304, 3" 404
 INDUSTRIAL - 8" 304, 4" 404

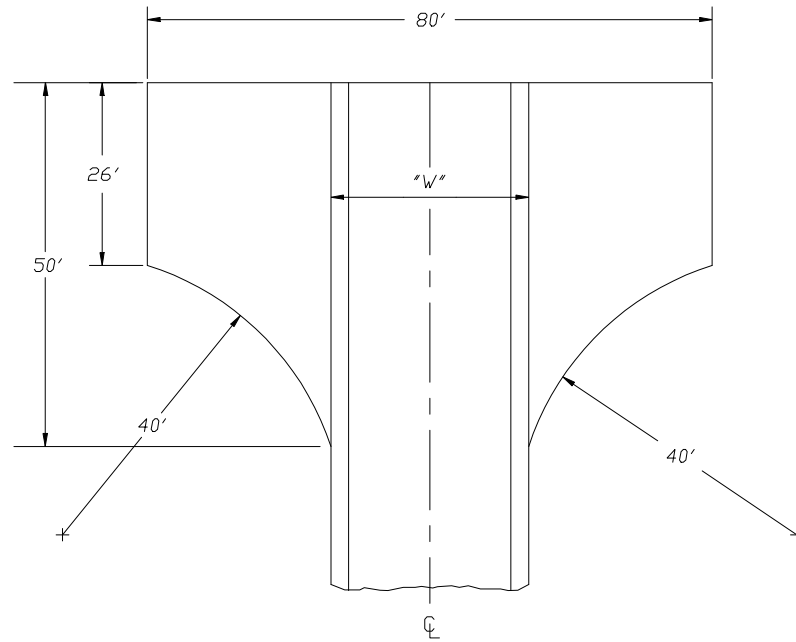
CONCRETE:
 RESIDENTIAL 5"
 INDUSTRIAL 5"

WIDTH QUANTITIES

LOCAL W = 28', 315 SQ. YDS.
 COLLECTOR: W = 35', 258 SQ. YDS.

TURNAROUNDS TO BE USED WHEN THE ADJACENT PARCEL IS NOT OWNED BY THE DEVELOPER OF THE SUBDIVISION.

ALTERNATE



ALTERNATE PAVEMENT

ASPHALT:
 RESIDENTIAL - 8" 304, 3" 404
 INDUSTRIAL - 8" 304, 4" 404

CONCRETE:
 RESIDENTIAL 5"
 INDUSTRIAL 5"

WIDTH QUANTITIES

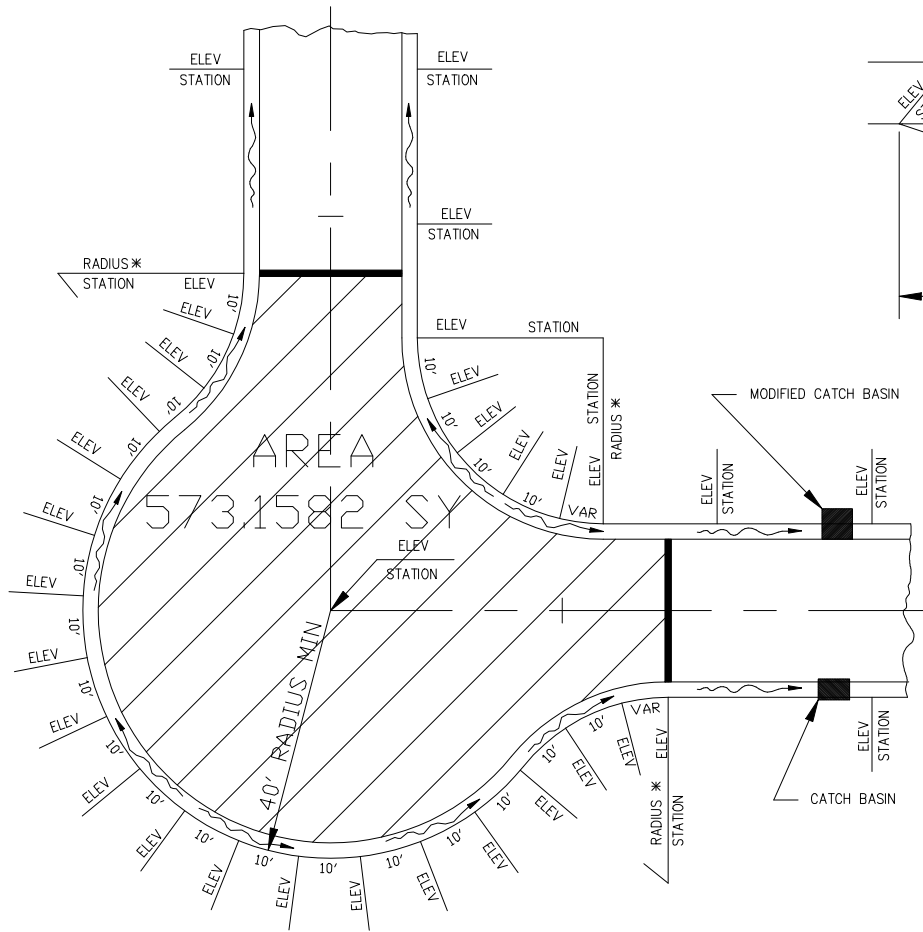
LOCAL W = 28', 200 SQ. YDS.
 COLLECTOR: W = 32', 185 SQ. YDS.
 W = 38', 152 SQ. YDS.

REVISIONS	DATE	C-21

ALTERNATE AND STANDARD TEMPORARY TURNAROUND

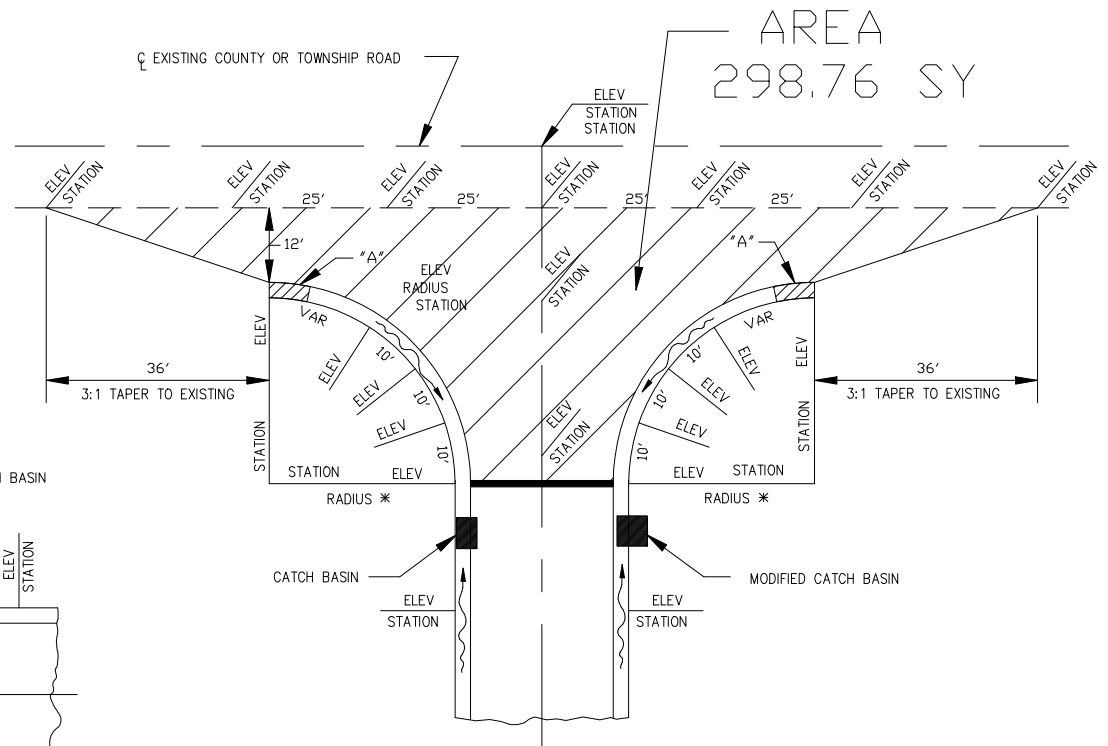
CHK. BY: C.A.H. EFFECTIVE DATE: 1-1-94

BUTLER COUNTY ENGINEERS OFFICE
 AND OPERATIONS FACILITY
 1921 FAIRGROVE AVENUE HAMILTON, OHIO
 PHONE 867-5744 45011



NOTE: The area was calculated using local street radius of 30' to the back of curb

NOTE: Pavement elevations to be provided as required by the County Engineers Office



NOTE "A": Back of curb to be tapered level to pavement in five (5) feet

NOTE: Match existing pavement at -2% grade to be held for a minimum distance of 20 feet with a preferred distance of 60 feet from existing edge of pavement

* MINIMUM RADIUS		BACK OF CURB	RIGHT OF WAY
STREET CLASSIFICATION	INDUSTRIAL	50'	30'
	MINDR ARTERIAL	50'	20'
	COLLECTOR	40'	20'
	LOCAL	30'	20'

REVISIONS	DATE	C-22
R/W RADIUS	12-20-94	
AREA CAL.	3-20-97	

TYPICAL INTERSECTION AND KNUCKLE DETAIL

CHK. BY: C.A.H. EFFECTIVE DATE: 1-1-94

BUTLER COUNTY ENGINEERS OFFICE AND OPERATIONS FACILITY
1921 FAIRGROVE AVENUE - HAMILTON, OHIO
PHONE 867-5744 45011

SPECIFICATIONS

*LETTERS: 4" - B - SERIES
WHITE DIAMOND GRADE
SHEETING*

*ONE SET OF 5 1/2" SIGN
HOLDERS FOR "U"
CHANNEL POST*

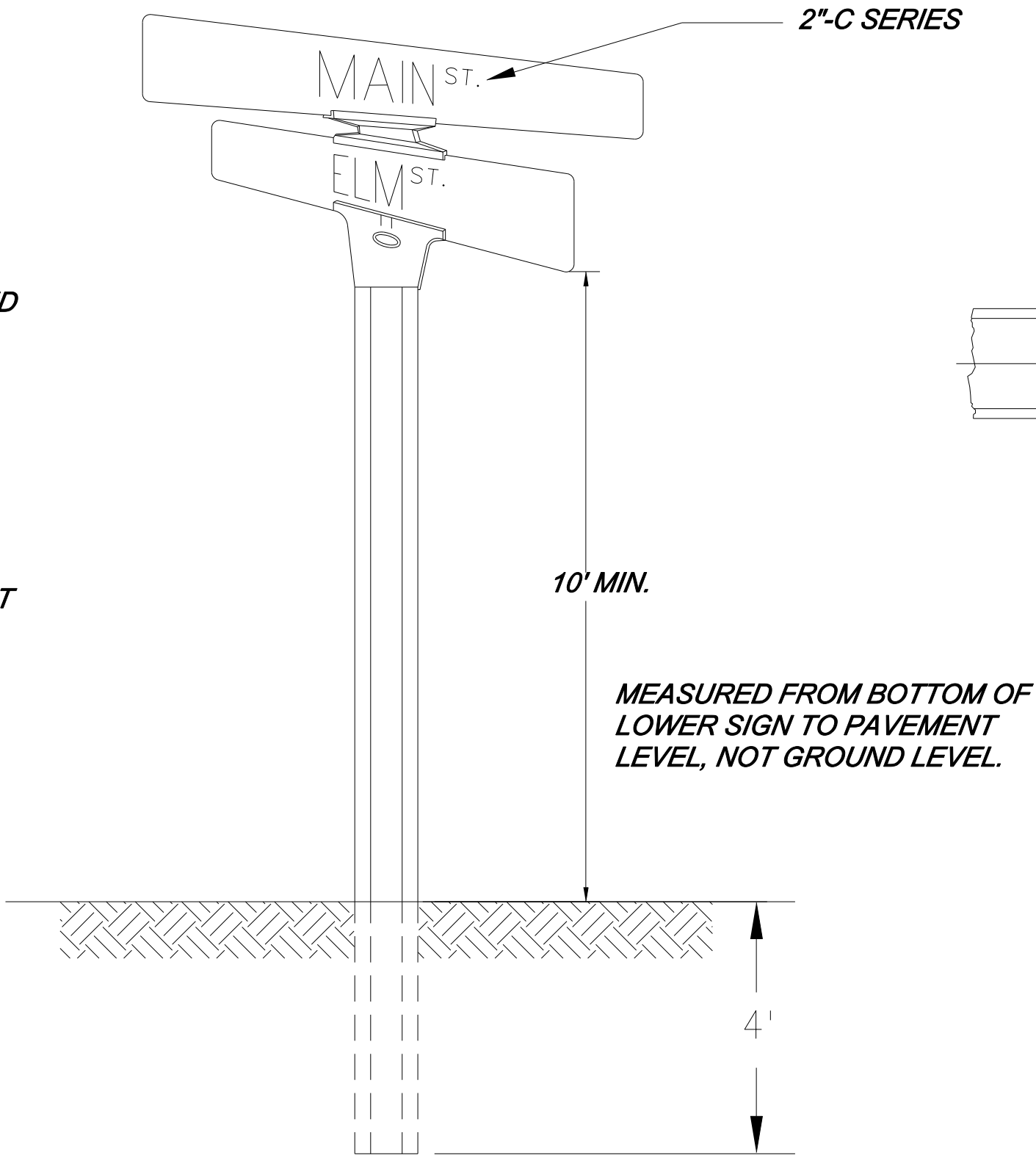
*SIGN: 6" ALUMINUM BLANKS
14 GAGE WITH GREEN, DIAMOND
GRADE REFLECTIVE SHEETING.*

NO BORDERS

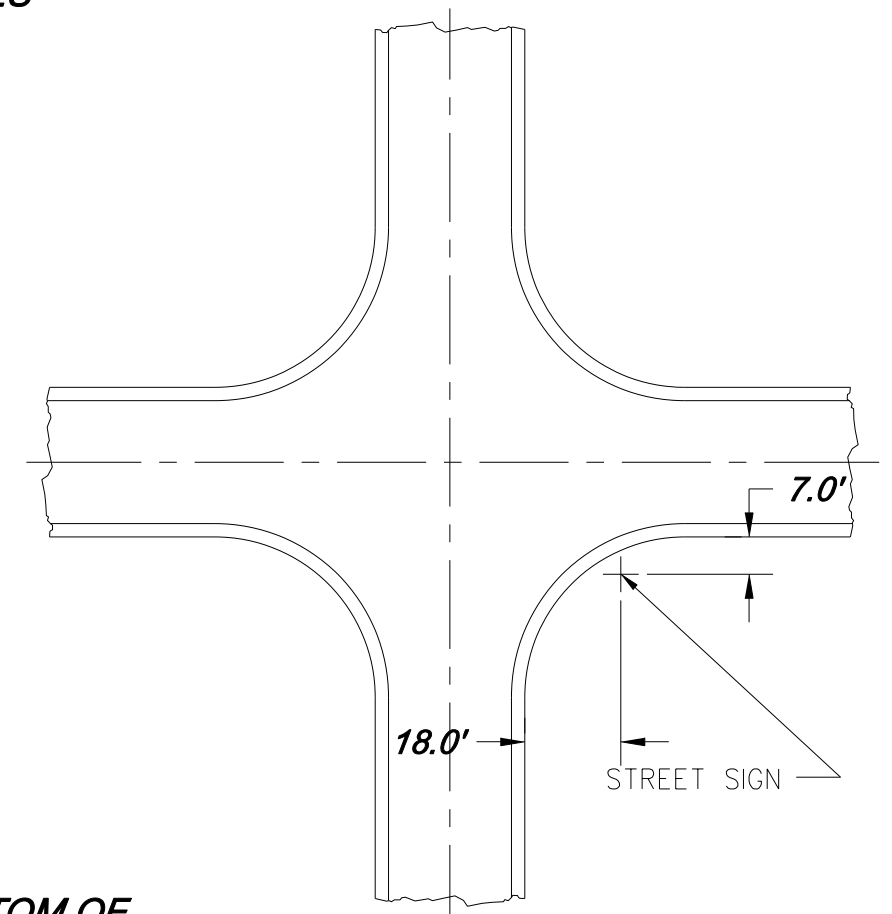
*SIGN WILL NOT BE ACCEPTED
IF DIAMOND GRADE SHEETING
IS NOT USED.*

*ONE 7 FOOT, 3 LBS. PER FOOT
GREEN "U" CHANNEL SIGN POST
ON BOTTOM AND ONE 7 FOOT,
2 LBS. PER FOOT, GREEN "U"
CHANNEL SIGN POST ON TOP,
BOLTED TOGETHER WITH NO
LESS THAN 2 BOLTS.*

*NOTE:
SIGNS MUST BE ERECTED FOR
SUBDIVISION STREET AND THE
ROADS THEY INTERSECT.*



SIGN LOCATION



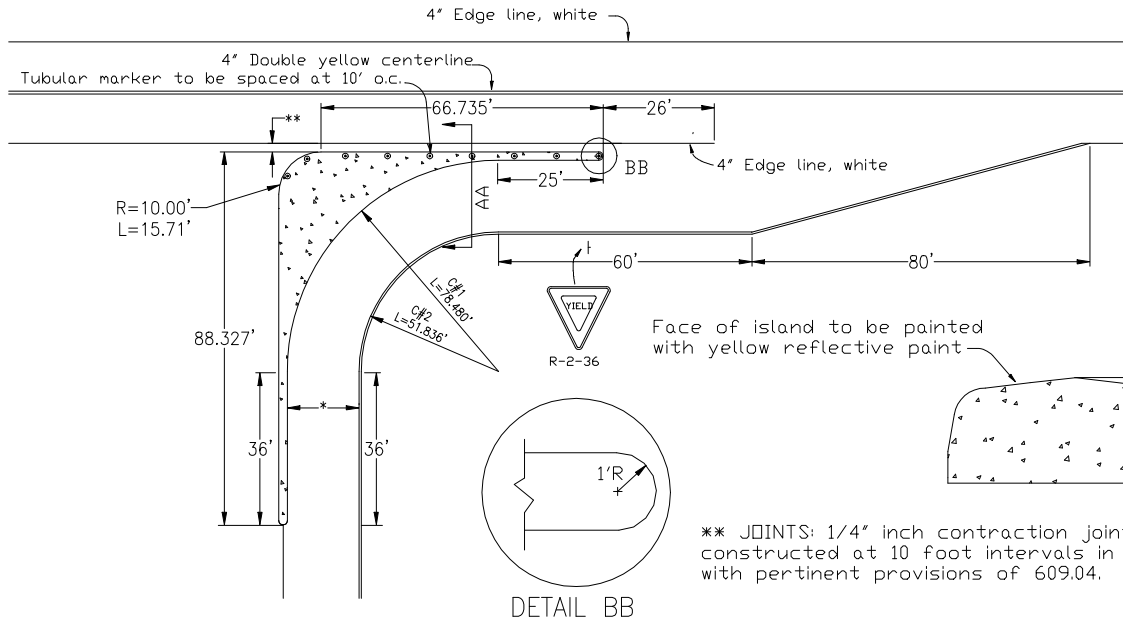
**ALL MEASUREMENTS TAKEN
FROM THE BACK OF CURB**

REVISIONS	DATE
SHEETING	2011

STREET NAME
SIGN SPECIFICATIONS

CHK. BY: C.A.H. EFFECTIVE DATE: 1-1-94

BUTLER COUNTY ENGINEERS OFFICE
AND OPERATIONS FACILITY
1921 FAIRGROVE AVENUE - HAMILTON, OHIO
PHONE 867-5744 45011



*** Pavement Width**

Unit	Pavement w/curb	Pavement w/o curb	Curve #1	Curve #2
Passenger Car	16'	14'	50'	33'
Single Unit Truck	17'	16'	50'	33'
Semi Truck	18'	17'	50'	60'

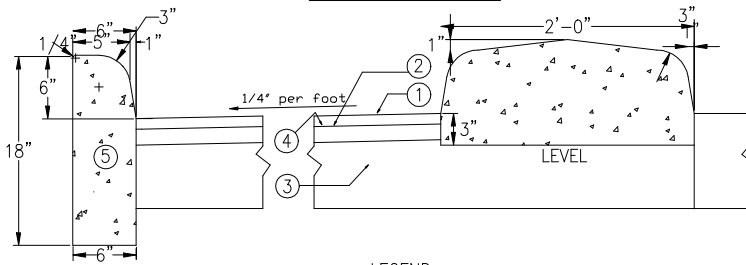
**** Curb Offset**
Speed

Speed	Offset
40 mph or less	2'
Over 40 mph	4' min
	from the edge of traffic lane
	or to edge of treated shoulder

** JOINTS: 1/4" inch contraction joints shall be constructed at 10 foot intervals in accordance with pertinent provisions of 609.04.

Estimated island area 881.3 sq. ft.
98.0 sq. yd.

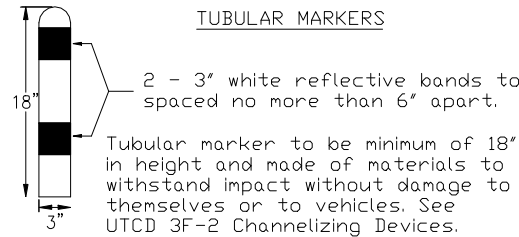
SECTION AA



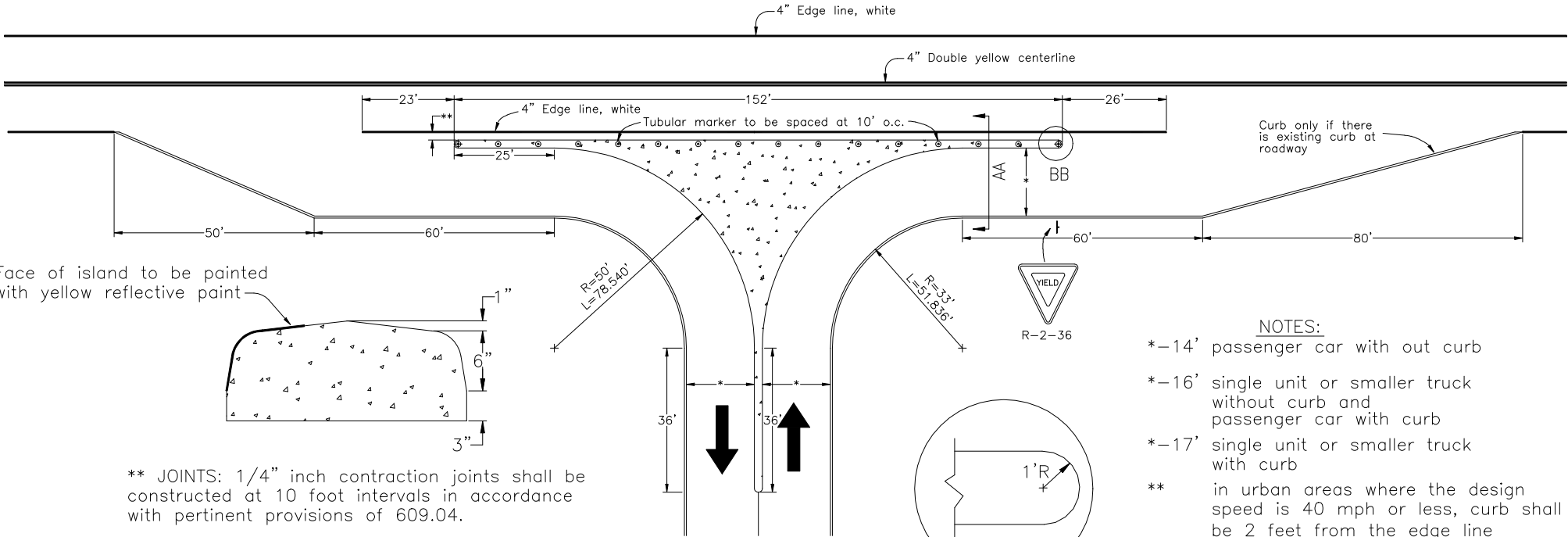
LEGEND

- ① Surface course
- ② Leveling course
- ③ Base course
- ④ Tack coat
- ⑤ O.D.O.T. type 6 concrete curb if required

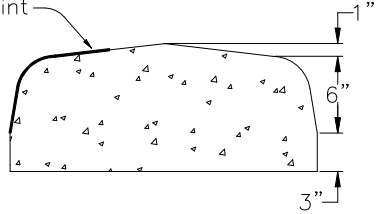
TUBULAR MARKERS



CHK. BY: G.J.W. EFFECTIVE DATE: 01-01-96
BUTLER COUNTY ENGINEERS OFFICE
AND OPERATIONS FACILITY
1921 FAIRGROVE AVENUE - HAMILTON, OHIO
PHONE 867-5744 45011



Face of island to be painted with yellow reflective paint

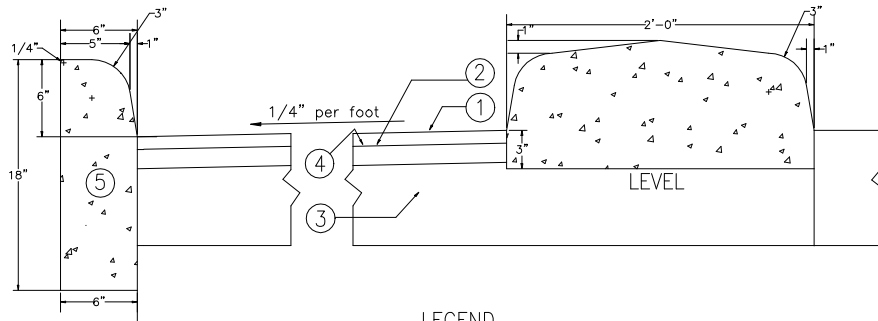


** JOINTS: 1/4" inch contraction joints shall be constructed at 10 foot intervals in accordance with pertinent provisions of 609.04.

NOTES:

- *-14' passenger car with out curb
- *-16' single unit or smaller truck without curb and passenger car with curb
- *-17' single unit or smaller truck with curb
- ** in urban areas where the design speed is 40 mph or less, curb shall be 2 feet from the edge line
- ** in urban and rural areas where the design speed is over 40 mph, curb shall be 4 feet from edge line or at the edge of the treated berm; whichever is greater

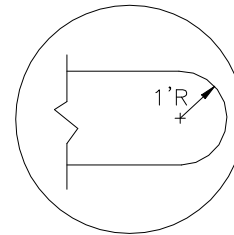
SECTION AA



LEGEND

- ① Surface course
- ② Leveling course
- ③ Base course
- ④ Tack coat
- ⑤ O.D.O.T. type 6 concrete curb if required

DETAIL BB

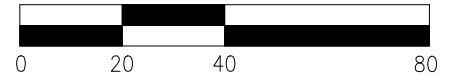


TUBULAR MARKERS

2 - 3" white reflective bands to be spaced no more than 6" apart.

Tubular marker to be minimum of 18" in height and made of materials to withstand impact without damage to themselves or to vehicles. See UTCDC 3F-2 Channelizing Devices.

Estimated island area 1547.6 sq. ft.
172.0 sq. yd.



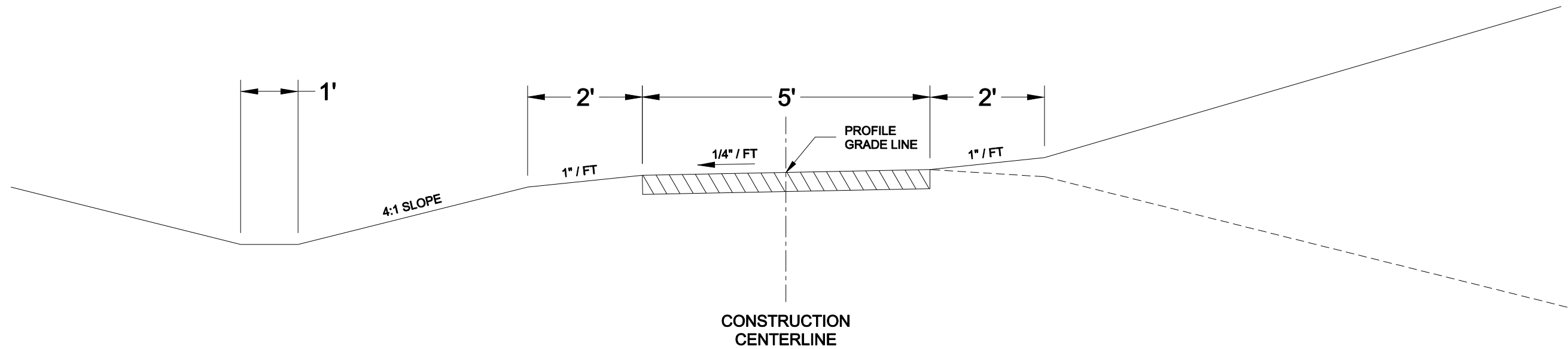
REVISIONS	DATE
CURB OFFSET	11/96

C-26

RIGHT IN
RIGHT OUT

CHK. BY: G.J.W. EFFECTIVE DATE: 01-01-96

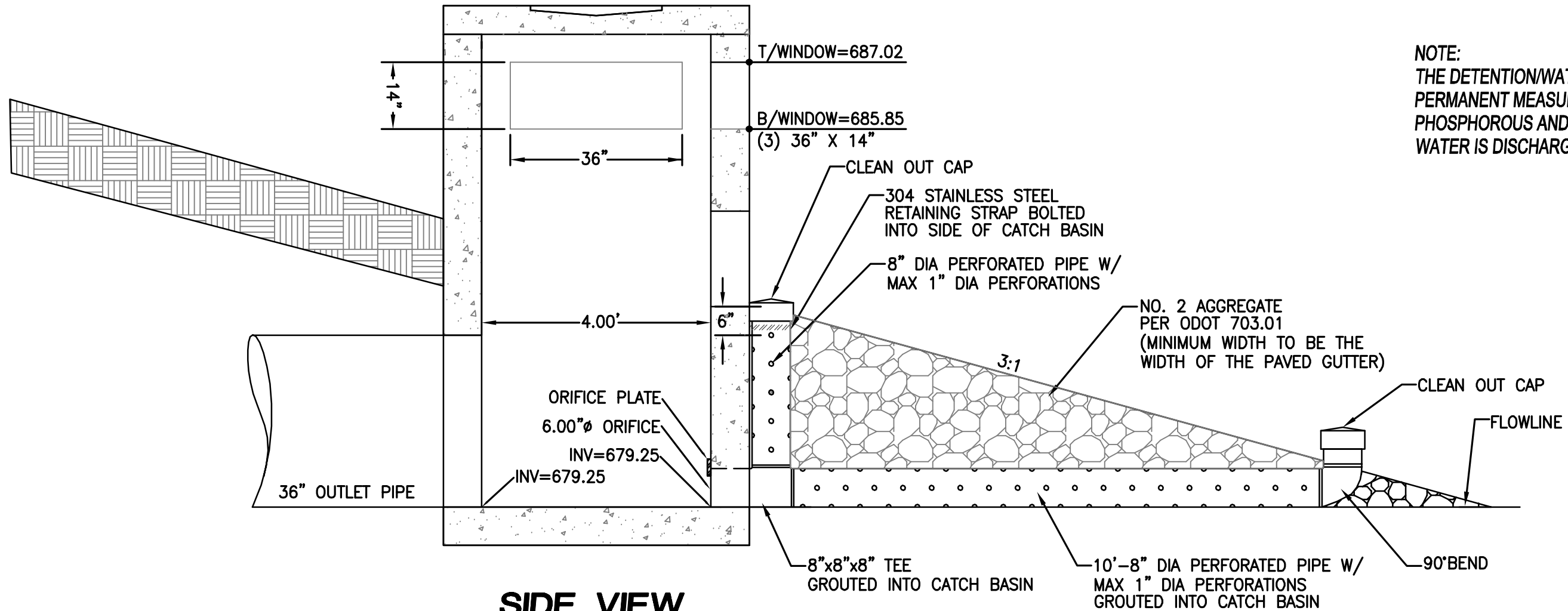
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ITEM 403 - 4" ASPHALT CONCRETE

ITEM 204 - SUBGRADE COMPACTION

REVISIONS	DATE	C-30B
		TYPICAL CROSS SECTION OF WALKING PATH
		CHK. BY: EJP EFFECTIVE DATE: 01-01-2011
		BUTLER COUNTY ENGINEERS OFFICE AND OPERATIONS FACILITY
		1921 FAIRGROVE AVENUE - HAMILTON, OHIO
		PHONE 867-5744 45011



SIDE VIEW
(NOT TO SCALE)

NOTE:
THE DETENTION/WATER QUALITY POND IS DESIGNED AS A
PERMANENT MEASURE TO REMOVE SEDIMENT,
PHOSPHOROUS AND NITROGEN RUNOFF BEFORE STORM
WATER IS DISCHARGED FROM THE CONSTRUCTION SITE.