



## 17890.00 Thomaston Drainage Report



482 Payne Road Scarborough Court  
Scarborough, ME 04074-8929

Prepared for: Maine Department of  
Transportation

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December 11, 2014

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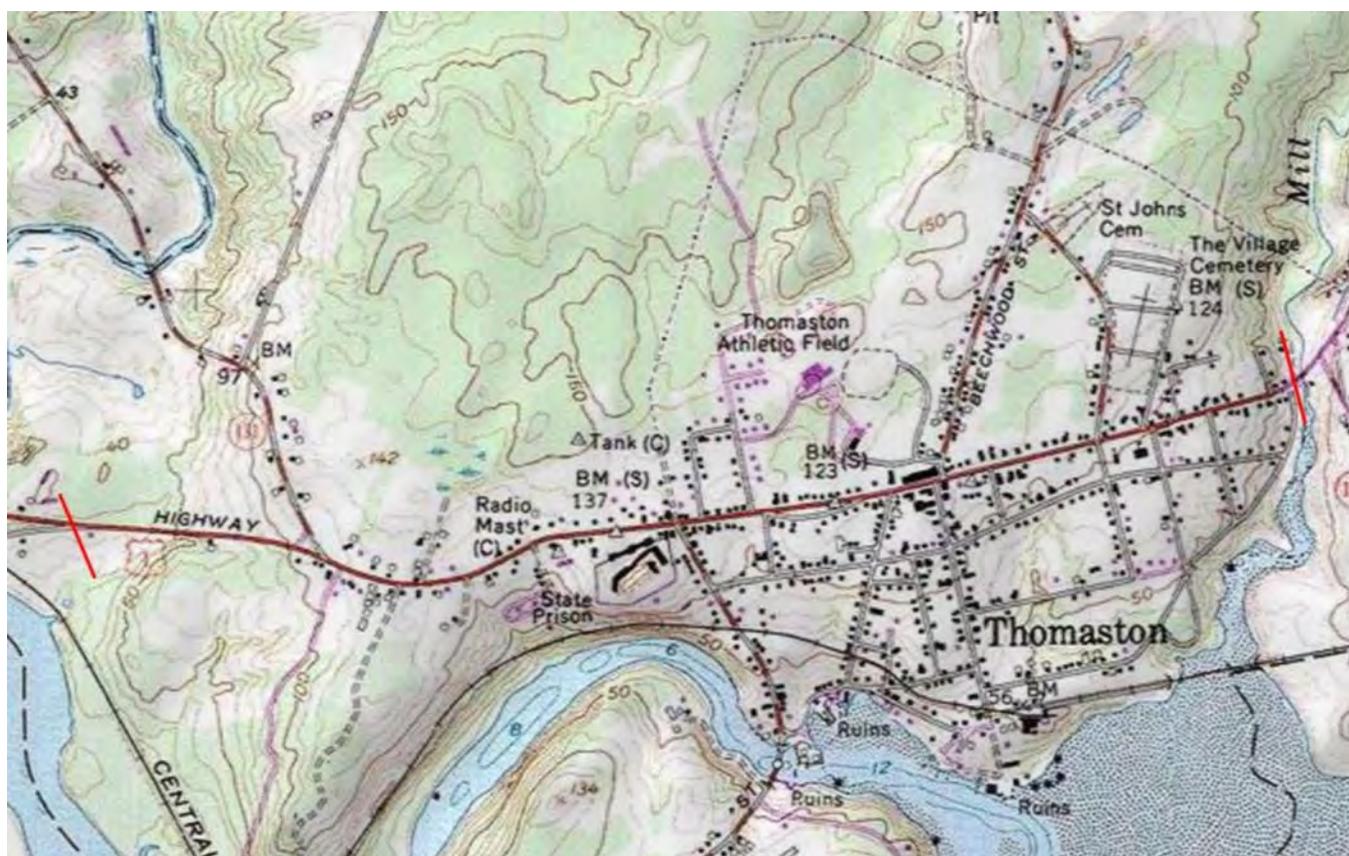
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Forward  
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## 1.0 FORWARD

This report details preliminary drainage design for the reconstruction of approximately 2.2 miles of Route 1 in Thomaston. The project area includes cross culverts, new and existing curbed areas, and new and existing closed drainage. This report details cross culvert hydrology and sizing and drainage basins that feed to the proposed closed drainage system.

The project runs from the intersection of Toll Bridge Road on the south/west end to the Mill River on the North/east end. Figure 1 shows the project extent, with project limits marked in red.



**Figure 1 - Route 1 Thomaston Project Exten**

The project area includes rural roadway, residential areas, and the developed downtown area of Thomaston. Existing culverts, sidewalks, drainage swales and closed drainage system components were evaluated as part of the preliminary design phase of drainage design.



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## 2.0 EXISTING DATA REVIEW

Existing data was compiled in ARCVIEW/GIS format. The Town of Thomaston furnished utility information as GIS layer files. Soils data was collected from the NRCS database. Land use data was collected from the National Land Use Dataset and wetlands added from the NWI dataset. The National Hydrography dataset, air photos and USGS topographic maps were also added to the GIS database. In addition project plans were imported showing existing and proposed design information for the project.

## 3.0 HYDROLOGY AND CROSSING HYDRAULICS

Drainage basins were evaluated to determine areas that flow to cross culverts and to proposed closed drainage system components. Three methods were used to calculate flows at each cross culvert, model Hydrocad, the Rational Formula, and the USGS Regional Formula for Peak Flow calculation.

Figure 2 shows drainage areas that flow to cross culverts near stations 12+70, and 18+50.



**Figure 2 - Drainage Basins, 12+70 and 18+50**

12+70: 2.33 acres drain to an existing 18" RCP cross culvert that outlets to the gore area between Route 1 and Toll Bridge Road. Runoff then crosses Troll Bridge Road through an existing 18" PCP cross culvert. Due to regarding along Route 1 the two crossing are to be connected



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with a Catch Basin. Also, due to excessive erosion at the outlet a plunge pool has been proposed. Soils are hydrologic soil group (HSG) C and land use is developed light industrial, with moderate slopes. Runoff curve number (RCN) is computed to be 83 with a time of concentration (TC) of 10.9 minutes. 10-, 50- and 100-year flows were computed by Hydrocad, the Rational Method and the USGS formula and averaged to 4.9, 7.2 and 8.1 cfs.

18+50: 28.2 acres drain to an existing 18" cmp culvert through a drainage basin with HSG C soils, moderate slopes and land use of meadows, woods and some residential use. RCN was computed as 69 and TC would be 24.5 minutes. 10-, 50- and 100-year averaged flows were computed as 21.7, 34.4 and 40.4 cfs.



**Figure 3 - Drainage Basins to 32+70, 49+50 and 55+70**

32+70: The existing 24" cmp cross culvert at 32+70 drains 31.3 acres of mixed woods, meadow and residential area, with HSG C soils. RCN was computed to be 72, with a TC of 50.3 minutes. Averaged flows were computed to be 18.5, 29.9, and 35.2 cfs for the 10-, 50- and 100-year storms.

49+50: 38.1 acres drain to an existing 2' X 2' box culvert. Land use is woods, meadow and light residential, and soils are of group C. RCN was computed to be 73 with TC of 41.3 minutes. 10-, 50- and 100-year averaged flows were computed to be 27.2, cfs. 42.5, and 49.6 cfs.



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55+70: A small area or 4.43 acres drains to an existing 18" culvert that drains down Ship Street. The area is primarily residential/light business. RCN is computed to be 84, with TC of 20.1 minutes. Flows were computed to be 7, 10.2 and 11.7 cfs.

75+20 and 76+80: Figure 4 shows the large drainage basin that drains to two 36" culverts at 75+20 and 76+80, drainage down Booker Street and across from School Street.



**Figure 4 - Drainage Basins to culverts near 75+20 and 76+80**

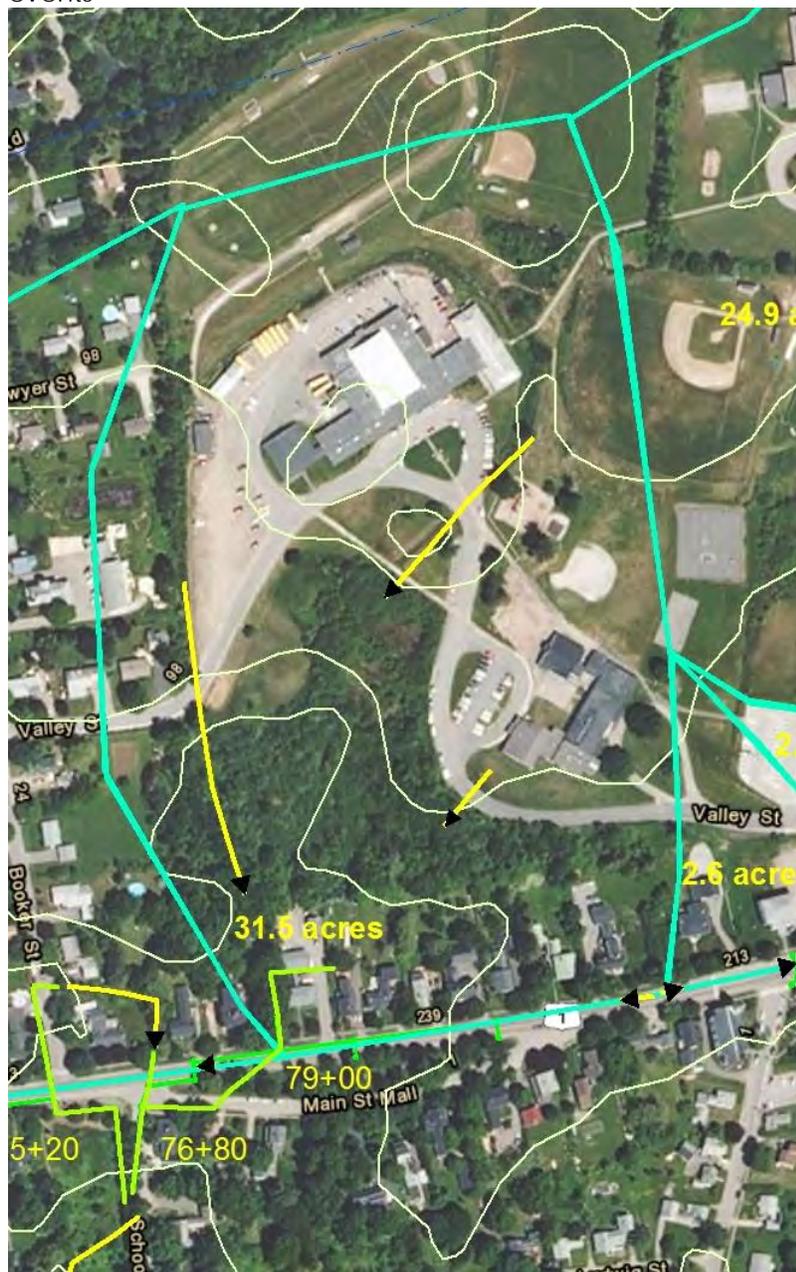
Drainage is split to flow to the two culverts near 75+20 and 76+80 and the area was assumed to split evenly between the culverts. The crossing at 75+20 was constructed relatively recently due to the crossing at 76+80 being over capacity. As such the crossing is proposed to be retained



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while connecting into the cross pipe with closed drainage. Land use is residential, small lots, business, and woods. Some soils in the upper watershed are of A and B HSG, but most of the watershed is comprised of C soils. RCN is 73 for these watersheds and TC is 51.6 minutes. Averaged flows were computed to be 17.6, 27.4, and 32.1 cfs for the 10-, 50- and 100-year events



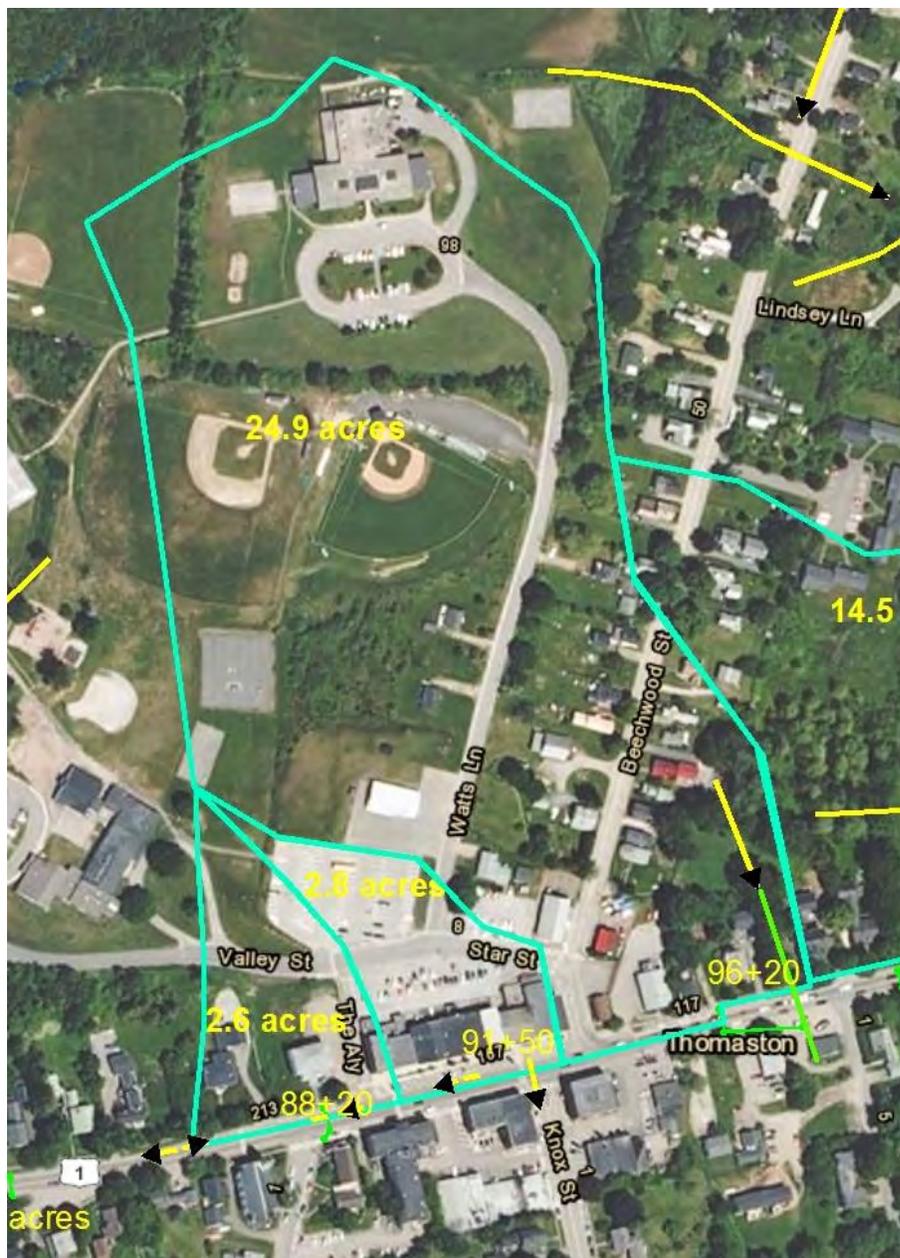
**Figure 5 - Drainage Basins Flowing to Existing Culvert at 79+00**

79+00: 31.5 acres drains to an existing 24" cmp cross culvert. Land use is developed, with buildings, fields and some residential, with soils of HSG C, resulting in a CN of 79. TC is estimated

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at 32.8 minutes. Averaged flow rates were computed using model Hydrocad, resulting in 10-, 50- and 100-year flows of 30.6, 45.9, and 53.1 cfs.



**Figure 6 - Drainage Basins to culverts at 88+20, 91+50 and 96+20**

88+20: A highly developed area of approximately 2.6 acres drains to an existing 12" box culvert according to existing condition plans. The drainage area is somewhat difficult to delineate with certainty. For this area, with HSG C soils, an RCN of 90 was estimated with a TC of 13 minutes. Averaged flow rates of 8.8, 11.6, and 12.7 cfs were computed for the 10-, 50- and 100-year storm events.

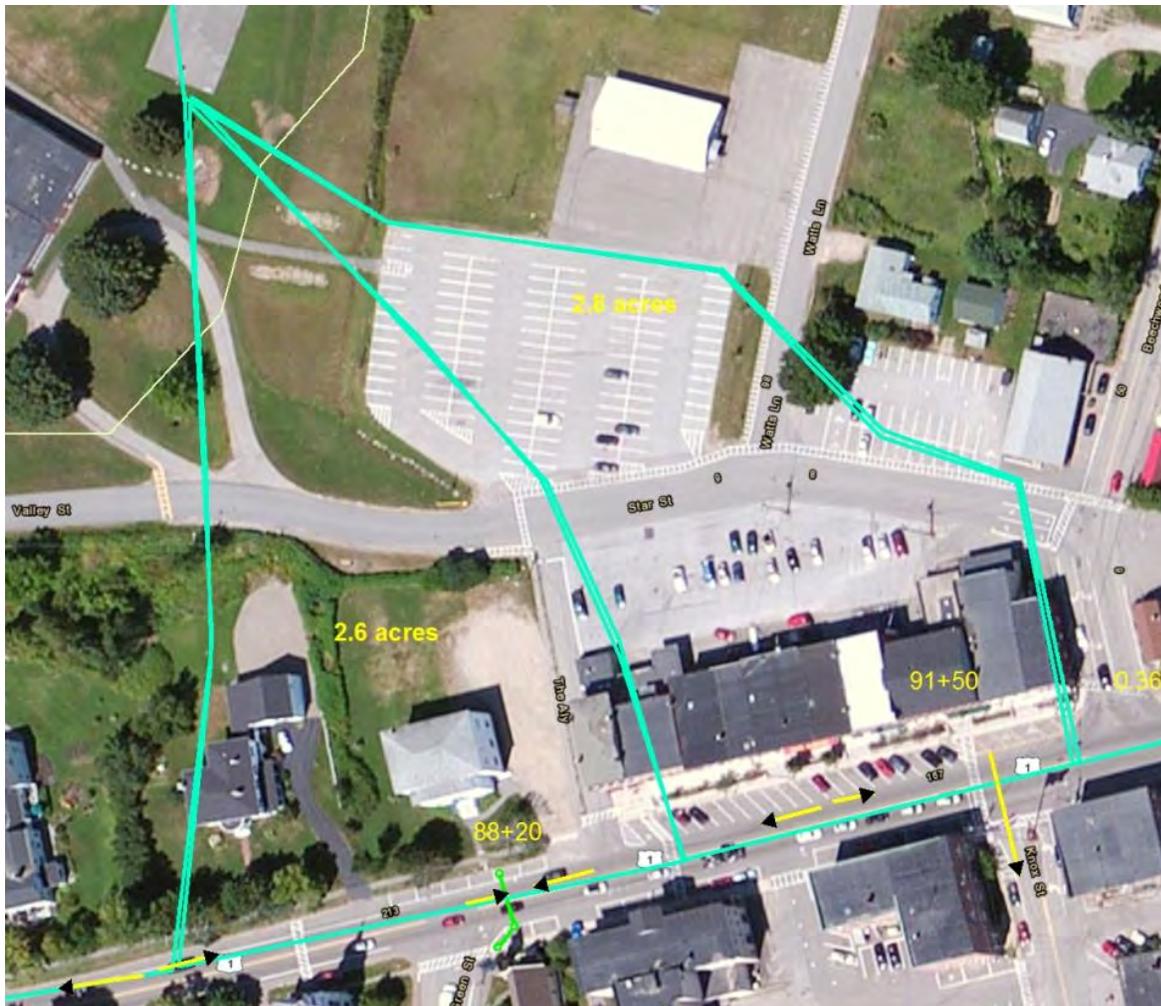


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91+50: Similar to the crossing at 88+20, this small area is highly developed and difficult to delineate with certainty. However, it is estimated that 2.8 acres drain to the existing 12" cmp with an RCN of 94 and TC of 9.2 minutes. This area is existing closed drainage, with project work being limited to overlay only as such this crossing is being retained. An additional catch basin is being proposed at 91+47, LT to accommodate the curb revisions. The additional catch basin will not add any additional flow to the crossing.

The estimated drainage areas for these two locations are shown in Figure 5b below. For final design, further consultation with the Town and field verification may assist in clarifying the extent of these two areas. At this stage of design, this area is proposed to have overlay pavement and drainage modifications are not part of the design effort.



**Figure 7 - Drainage Areas to crossing near 88+20 and 91+50**

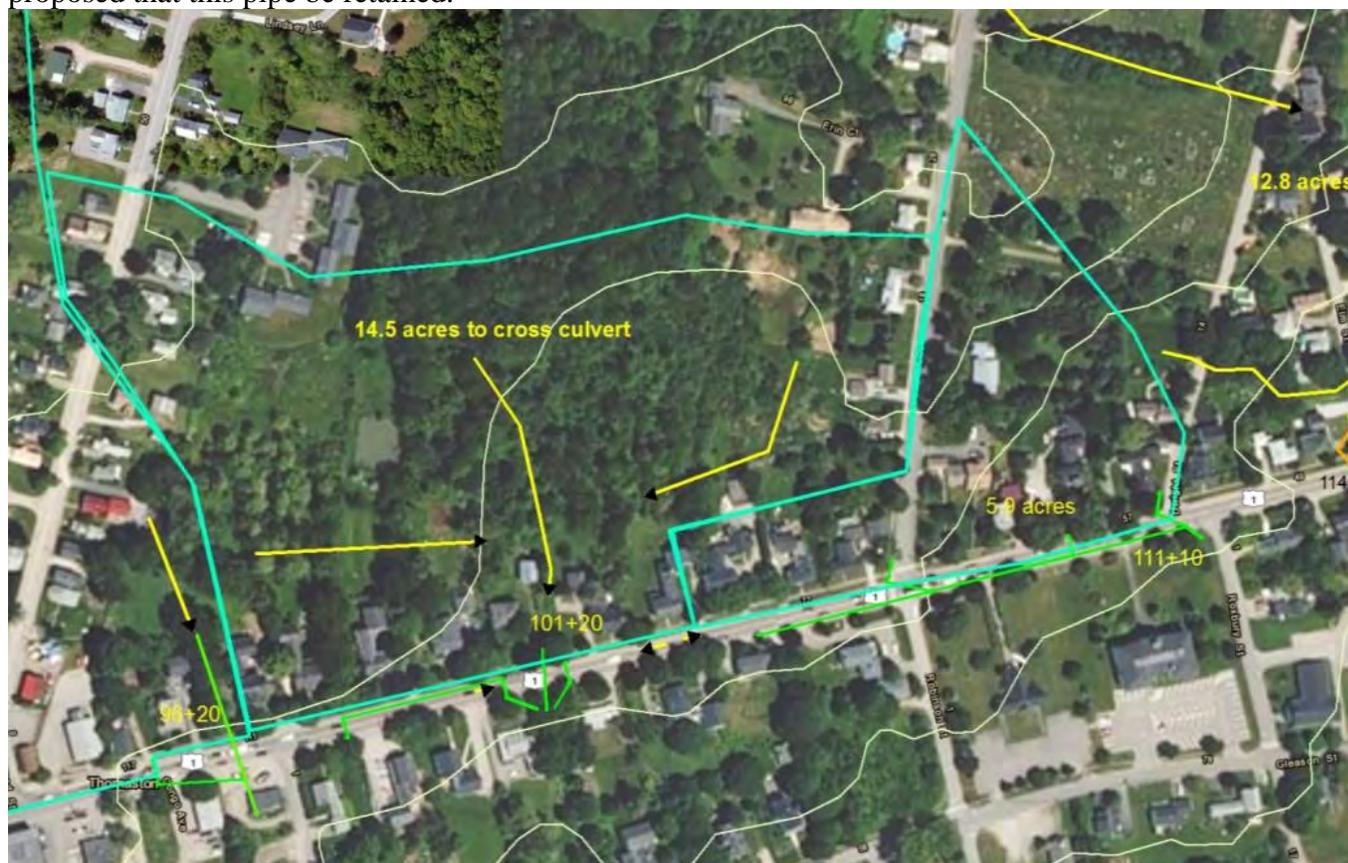
96+20: An existing 30" RCP conveys 24.9 acres of mixed sports fields, buildings, residential and woods, with HSG C. RCN is 75 with TC of 47.3 minutes. Averaged flows for the 10-, 50- and 100-year flows were computed to be 21.1, 31.9, 36.9 cfs. This crossing originates about 180'



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from the back of proposed sidewalk. Due to the impacts of replacing this concrete pipe it is proposed that this pipe be retained.



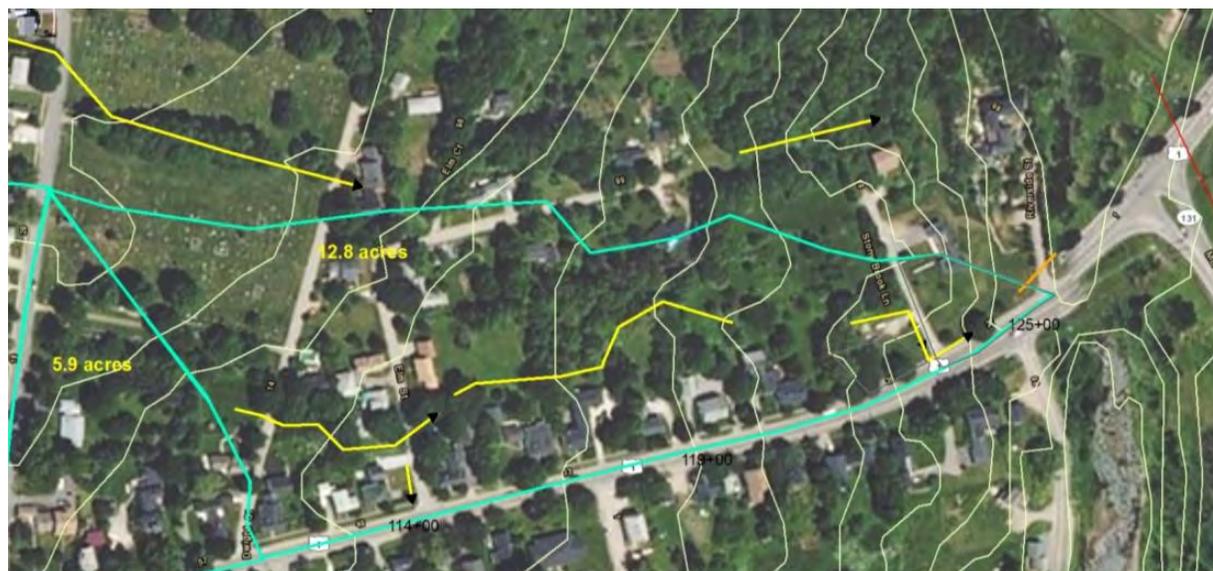
**Figure 8 - Drainage Areas to culverts at 101+20 and 111+10**

101+20: 14.5 acres drains to an existing 18" cmp culvert. An additional 1.7 acres drains to a closed storm drain system. With mixed land use of residential and woods, and soils in HSG C, an RCN of 71 and a TC of 29 minutes were estimated. 10-, 50- and 100-year flows were computed to be 12.3, 19.4, and 22.7 cfs respectively.

111+10: An existing 24" cmp drains 5.9 acres of HSG C and mixed residential and woods. This area drains through a closed drainage system with catch basins as described in a later section. In the existing condition this crossing outlets and runs along South along Roxbury Street where it enters another closed drainage system before outletting to Mill River. The proposed design eliminates the outlet along Roxbury street and carries the flow in closed drainage to the outlet at 125+90, LT.

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**Figure 9 - Drainage Basin to crossing near 125+20**

125+20: 12.8 acres drains to an existing 24" cmp that crosses Route 1. With mixed land use of cemetery, residential and brush, and HSG C, an RCN of 76 and a TC of, 25.1 minutes were computed. 10-, 50- and 100-year flows of 12.1, 18.8, and 22.0 cfs were calculated. The proposed design will eliminate the crossing at 125+20 and outlet to Mill River on the North side of Route Hydrologic calculations are summarized below and detailed in Hydrocad output in the Appendix.

Location	Area, Acres	TC, min.	Q10, cfs	Q50, cfs	Q100, cfs	Existing size
12+20	2.33	10.9	4.9	7.2	8.1	18" rcp
18+50	28.2	24.5	21.7	34.4	40.4	18" rcp
32+70	31.3	50.3	18.5	29.9	35.2	24" cmp
49+50	38.1	41.3	27.2	42.5	49.6	Box 2X2
55+70	4.43	20.1	7.0	10.2	11.7	18" cmp to Ship st
75+20	24.1	51.6	17.6	27.4	32.1	36" booker St
76+80	24.1	51.6	17.6	27.4	32.1	36" cmp School st
79+00	31.5	32.8	30.6	45.9	53.1	24" cmp
88+20	2.6	13	8.8	11.6	12.7	12" box
91+50	2.8	9.2	9.7	12.4	13.5	12" cmp
96+20	24.9	47.3	21.1	31.9	36.9	30" cmp
101+20	14.5	29	12.3	19.4	22.7	18" cmp
125+20	12.8	25.1	12.1	18.8	22.0	24" cmp

**Table 3.1 Summary of Crossing Hydrology**



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### 3.1 CROSSING HYDRAULICS

Location	Existing size	Proposed Size		Comments
		HW/D = 1.5	HW/D = 1	
12+75	18" rcp	18	18	18" Pipe Selected
18+50	18" rcp	30	36	Cover allows for HW/D=1.5. 30" Pipe Selected
32+70	24" cmp	30	33	Cover allows for HW/D=1.5. 30" pipe selected
49+50	Box 2X2	30	36	Covert allows for HW/D=1.5. 30" Pipe Selected
55+70	Closed Drainage See Section 4.0			
75+20	Existing 36" Crossing recently constructed by the town. This crossing will not be replaced			
76+80	36" cmp	24	27	Cover allows for HW/D=1.5. 24" selected for inlet.
79+00	24" cmp	24	27	Cover allows for HW/D=1.5. 24" selected for inlet.
88+20	Closed Drainage See Section 4.0			
91+50	In Cold Plane and Overlay Area, Pipe Being Retained			
96+20	Pipe inlet off site, Pipe Being Retained			
101+20	18" cmp	21	24	Covert does not allow for HW/D=1.5. 24" Pipe Selected
111+10	Closed Drainage See Section 4.0			
125+20	Crossing Being Eliminated			

**Table 3.2 - Crossing Hydraulics Summary**

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### 4.0 CLOSED DRAINAGE SYSTEMS

Closed drainage systems have been evaluated for a 10 year design storm using the modified rational method as outlined in chapter 12 of MaineDOT Highway Design Guide. The IDF information was derived using the coefficients for Eastport which is geographically the closest to Thomaston of the six locations listed in the Highway Design Guide. Manning's equation analysis was used to size the pipes in each system with the exception that crossings are a minimum of 18". All pipes downstream of a crossing are 18" or larger. All pipes have been sized assuming that they will be smooth lined with  $n=0.013$ .

#### 4.1 SYSTEM 1

System 1 drains the roadway from Oyster River Road to the highpoint at 42+40.64. The system includes the cross culvert that outlets at 32+36, RT. See the section on cross culverts for more information.

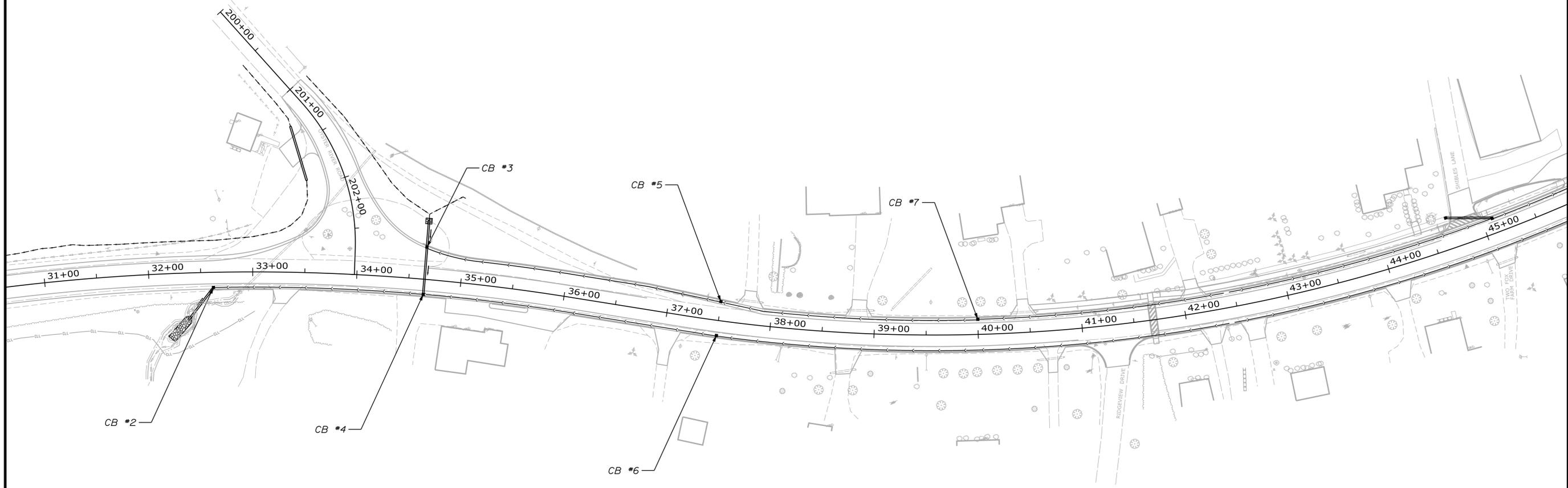
ID	Station	Area (ac)	Rational C	TC (min)	Flow (cfs)	Spread (ft)
CB #2	32+62, RT	0.18	0.9	5	1.2	1.1
CB #3	34+65, LT	0.24	0.81	5	1.1	4.6
CB #4	34+65, RT	0.23	0.9	5	1.3	5.1
CB #5	37+50, LT	0.17	0.9	5	0.8	3.9
CB #6	37+50, RT	0.09	0.9	5	0.4	0.8
CB #7	40+00, LT	0.31	0.52	10	0.6	3.3

**Table 4.1 – System 1 Catch Basin Summary**

Pipe	Design Storm (yr)	Diameter (in)	flow (cfs)	Slope (%)	n	capacity (cfs)
CB #2 - Outlet	50	30	See Crossing Hydraulics Section			
CB #4 – CB #1	50	30	See Crossing Hydraulics Section			
CB #3 – CB #4	50	30	See Crossing Hydraulics Section			
Inlet – CB #3	50	30	See Crossing Hydraulics Section			
CB #6 – CB #4	10	12	0.38	2.0	0.013	5.1
CB #5- CB #3	10	12	1.10	1.3	0.013	4.1
CB #7 – CB #5	10	12	0.48	3.6	0.013	6.9

**Table 4.2 - System 1 Hydraulics**





SHEET NUMBER  
**4.12**

**THOMASTON  
ROUTE 1  
FIGURE 10 - SYSTEM 1 LAYOUT**

PROJ. MANAGER	E. MARTIN	BY	DATE
DESIGN-DETAILED	T. LUTHER		
CHECKED-REVIEWED	G. SANTI		2/28/14
DESIGN-DETAILED	J. WAINWRIGHT		
DESIGN-DETAILED	P. ARMATA		
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE	P.E. NUMBER	DATE

STATE OF MAINE  
DEPARTMENT OF TRANSPORTATION  
**STP-1789(000)X**  
PIN  
17890.00  
HIGHWAY PLANS

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### 4.2 SYSTEM 2

System 2 drains the roadway from the highpoint at 42+40.64 to Ship Street . The system includes the cross culvert that outlets at 49+50, RT. See the section on cross culverts for more information.

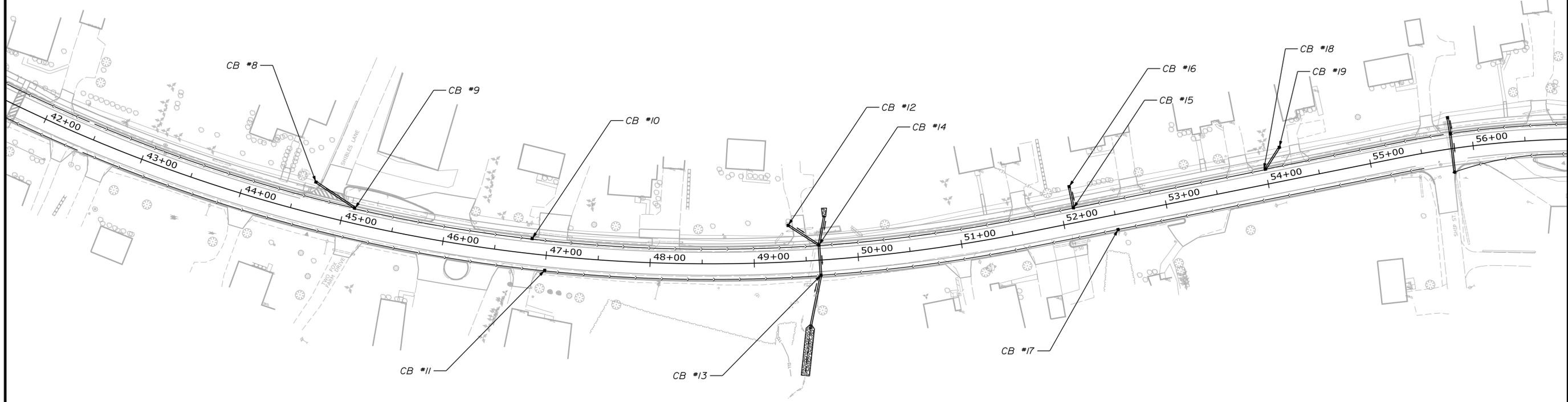
ID	Station	Area (ac)	Rational C	TC (min)	Flow (cfs)	Spread (ft)
CB #8	44+68, LT	0.5	0.3	7	0.72	2.49
CB #9	45+10, LT	0.16	0.83	5	0.62	3.95
CB #10	46+85, LT	0.12	0.9	5	0.66	3.51
CB #11	47+00, RT	0.09	0.9	5	0.43	3.32
CB #12	49+34, LT	0.46	0.3	7	0.66	2.36
CB #13	49+63, RT	0.17	0.9	5	0.81	3.79
CB #14	49+63, LT	0.25	0.85	7	1.06	4.11
CB #15	52+12, LT	0.19	0.83	5	0.39	3.95
CB #16	52+12, LT					
CB #17	52+50, RT	0.14	0.9	5	0.66	5.34
CB #18	53+00, LT	0.16	0.9	5	0.76	1.39
CB #19	54+17, LT					

**Table 4.3 - System 2 Catch Basin Summary**

Pipe	Design Storm (yr)	Diameter (in)	flow (cfs)	Slope (%)	n	capacity (cfs)
CB #8 - CB #9	10	12	0.63	2.0	0.013	5.04
CB #9 - CB #10	10	12	1.1	2.2	0.013	5.25
CB #10 - CB #14	10	12	1.64	1.43	0.013	4.25
CB #11 - CB #13	10	12	0.67	1.43	0.013	4.24
CB #12 - CB #14	10	12	0.58	2	0.013	5.04
Inlet - CB #14	50	30	See Crossing Hydraulics Section			
CB #14 - CB #13	50	30	See Crossing Hydraulics Section			
CB #13 - Outlet	50	30	See Crossing Hydraulics Section			
CB #15 - CB #14	10	15	2.74	0.5	0.013	4.57
CB #16 - CB #15	10	12	0.42	2.0	0.013	5.04
CB #18 - CB #15	10	12	1.88	0.5	0.013	2.52
CB #17 - CB #13	10	12	0.46	0.5	0.013	2.52
CB #19 - CB #18	10	12	0.40	2.0	0.013	5.04

**Table 4.4 - System 2 Hydraulics**





SHEET NUMBER  
**4.14**

**THOMASTON  
ROUTE 1**  
**FIGURE 11 - SYSTEM 2 LAYOUT**

PROJ. MANAGER	E. MARTIN	BY	DATE
DESIGN DETAILED	T. LUTHER		
CHECKED-REVIEWED	G. SANTI		2/28/14
DESIGN DETAILED	J. MAYNARD		SIGNATURE
DESIGN DETAILED	P. ARMATA		P.E. NUMBER
REVISIONS 1			DATE
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

STATE OF MAINE  
DEPARTMENT OF TRANSPORTATION  
**STP-1789(000)X**

PIN  
17890.00  
HIGHWAY PLANS

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### 4.3 SYSTEM 3

System 3 consists of catch basins collecting drainage along Route 1 from Ship Street to the high point at 64+54. The existing drainage system near project station 55+80 that drains south along Ship Street will be used to outlet drainage from this system.

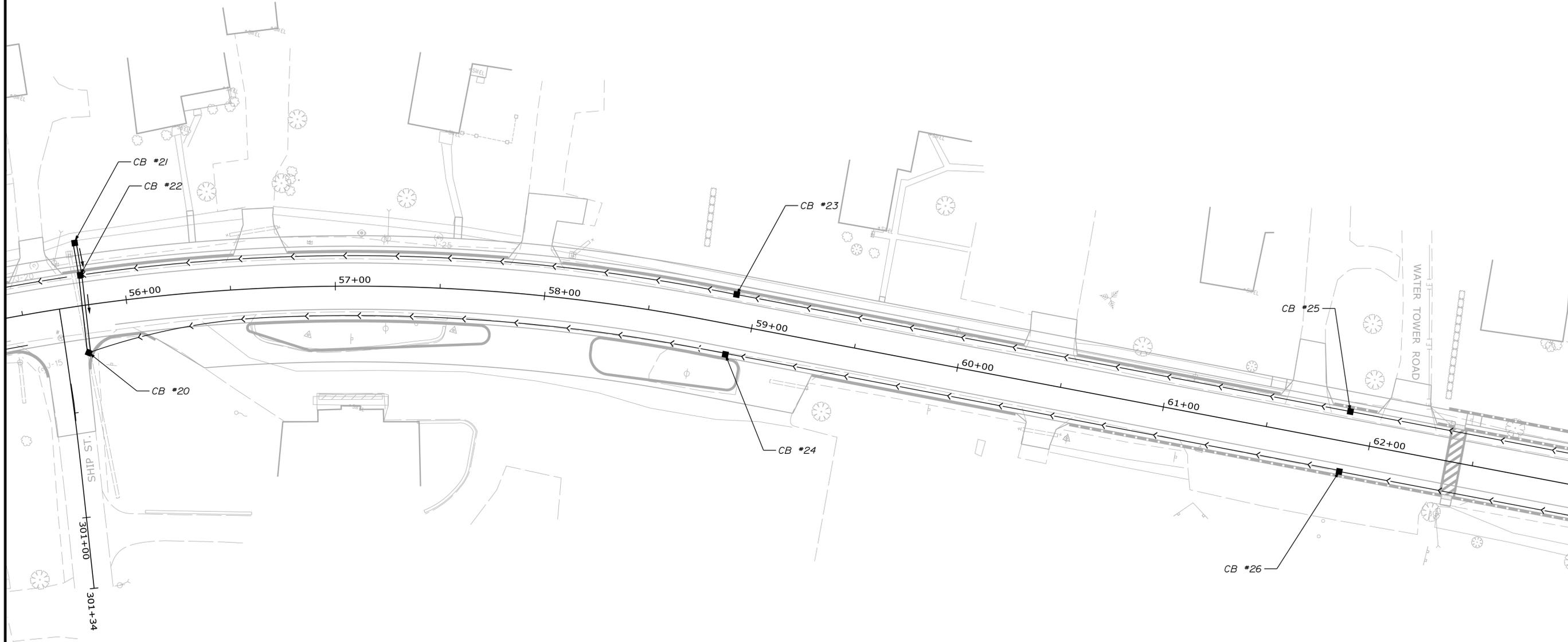
ID	Station	Area (ac)	Rational C	TC (min)	Flow (cfs)	Spread (ft)
CB #20	55+79, RT	0.12	0.9	5	0.57	4.49
CB #21	55+80, LT	1.43	0.3	8	1.96	1.94
CB #22	55+80, LT	0.17	0.83	5	0.74	9.00
CB #23	58+90, LT	1.7	0.34	9	2.54	6.67
CB #24	58+90, RT	0.13	0.9	5	0.62	4.28
CB #25	61+88, LT	1.3	0.45	10	2.47	6.23
CB #26	61+88, RT	0.12	0.9	5	0.57	3.68

**Table 4.5 - System 3 Catch Basin Summary**

Pipe	Design Storm (yr)	Diameter (in)	flow (cfs)	Slope (ft/ft)	n	capacity (cfs)
CB #20 - Outlet	10	18	6.3	0.016	0.013	13.15
CB #22 - CB #20	10	18	5.19	0.01	0.013	10.5
CB #21 - CB #22	10	12	1.72	0.02	0.013	5.04
CB #23 - CB #22	10	15	2.87	0.022	0.013	9.67
CB #24 - CB #20	10	12	0.84	0.023	0.013	5.44
CB #25 - CB #23	10	12	1.25	0.021	0.013	5.19
CB #26 - CB #24	10	12	0.41	0.021	0.013	5.19

**Table 4.6 - System 3 Hydraulics**





SHEET NUMBER  
**4.16**

**THOMASTON  
 ROUTE 1  
 FIGURE 12 - SYSTEM 3 LAYOUT**

PROJ. MANAGER	E. MARTIN	BY	DATE
DESIGN DETAILED	T. LUTHER		
CHECKED-REVIEWED	G. SANTY		2/28/14
DESIGN DETAILED	J. WAINWRIGHT		
DESIGN DETAILED	P. ARMATA		
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE  
 P.E. NUMBER  
 DATE

STATE OF MAINE  
 DEPARTMENT OF TRANSPORTATION  
**STP-1789(000)X**  
 PIN  
 17890.00  
 HIGHWAY PLANS

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### 4.4 SYSTEM 4

System 4 consists of catch basins collecting drainage along Route 1 from the high point at 64+54 to the crossing at 75+20. The crossing at 75+20 was recently constructed to reduce flow to the crossing at 77+00. Since the crossing is in good condition the pipes are proposed to be retained with new catch basins being added to connect the proposed system.

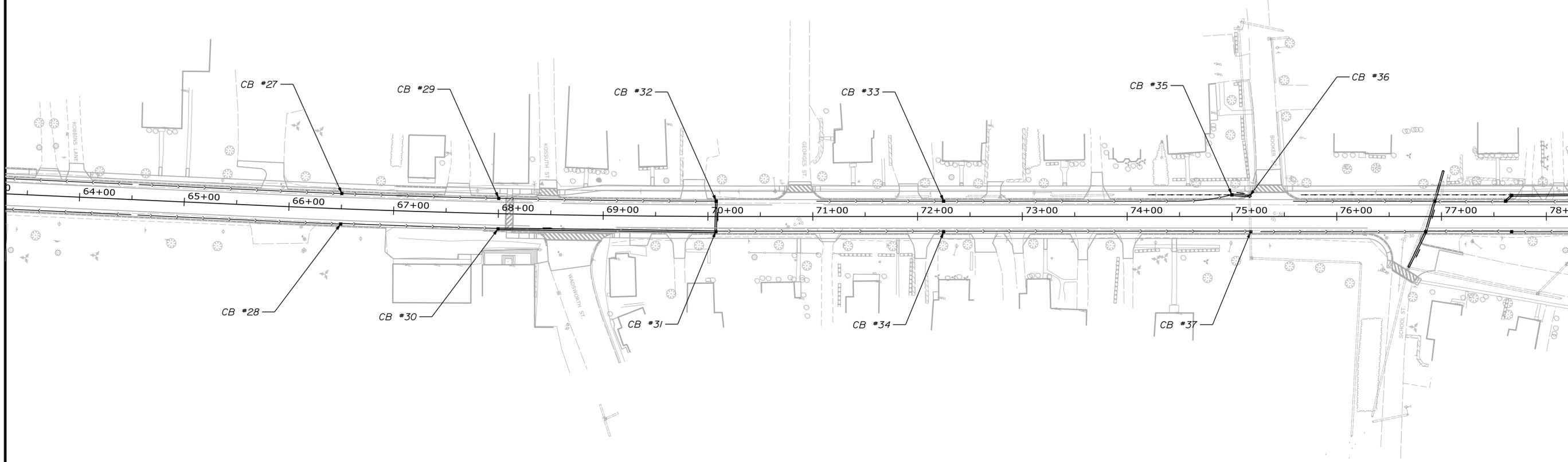
ID	Station	Area (ac)	Rational C	TC (min)	Flow (cfs)	Spread (ft)
CB #27	66+50, LT	0.1	0.9	5	0.47	4.97
CB #28	66+50, RT	0.23	0.49	8	0.52	4.99
CB #29	68+00, LT	0.11	0.9	5	0.52	1.02
CB #30	68+00, RT	0.25	0.79	8	0.9	4.58
CB #32	70+08, LT	0.08	0.9	5	0.36	2.19
CB #31	70+08, RT	0.05	0.9	5	0.24	3.23
CB #33	72+25, LT	0.54	0.55	8	1.36	4.93
CB #34	72+25, RT	0.13	0.9	5	0.62	3.9
CB #35	75+00, LT	0.03	0.8	5	0.1	0.58
CB #36	75+17, LT	0.51	0.55	8	1.28	5.99
CB #37	75+18, RT	0.12	0.9	5	0.57	4.22

**Table 4.7 - System 4 Catch Basin Summary**

Pipe	Design Storm (yr)	Diameter (in)	flow (cfs)	Slope (ft/ft)	n	capacity (cfs)
CB #27 - CB #29	10	12	0.39	0.007	0.013	3.04
CB #28 - CB #30	10	12	0.42	0.009	0.013	3.37
CB #29 - CB #32	10	12	1.00	0.029	0.013	6.04
CB #30 - CB #31	10	12	1.12	0.027	0.013	6.15
CB #32 - CB #31	10	18	1.34	0.01	0.013	10.5
CB #31 - CB #34	10	18	2.90	0.026	0.013	17
CB #33 - CB #35	10	12	0.90	0.014	0.013	4.17
CB #34 - CB #37	10	18	3.45	0.019	0.013	14.43
CB #35 - CB #36	10	12	1.00	0.005	0.013	2.52
CB #36 - CB #37	50	36	See Crossing Hydraulics Section			
CB #37 - existing CB	50	36	See Crossing Hydraulics Section			
Inlet - CB #36	50	36	See Crossing Hydraulics Section			

**Table 4.8 - System 4 Hydraulics**





SHEET NUMBER

4.18

THOMASTON  
ROUTE 1

FIGURE 13 - SYSTEM 4 LAYOUT

DESIGN DETAILED	E. MARTIN	BY	DATE
CHECKED-REVIEWED	T. LUTHER		2/28/14
DESIGNS DETAILED	G. SANTI		SIGNATURE
DESIGNS DETAILED	M. WARD		P.E. NUMBER
REVISIONS 1	P. ARMAITA		DATE
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

STATE OF MAINE  
DEPARTMENT OF TRANSPORTATION

STP-1789(000)X

PIN  
17890.00

HIGHWAY PLANS

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### 4.5 SYSTEM 5

System 4 consists of catch basins collecting drainage along Route 1 from the crossing at 75+20 to the highpoint at 85+94. The system will combine with the crossing at 77+00 and connect to the existing system on School Street.

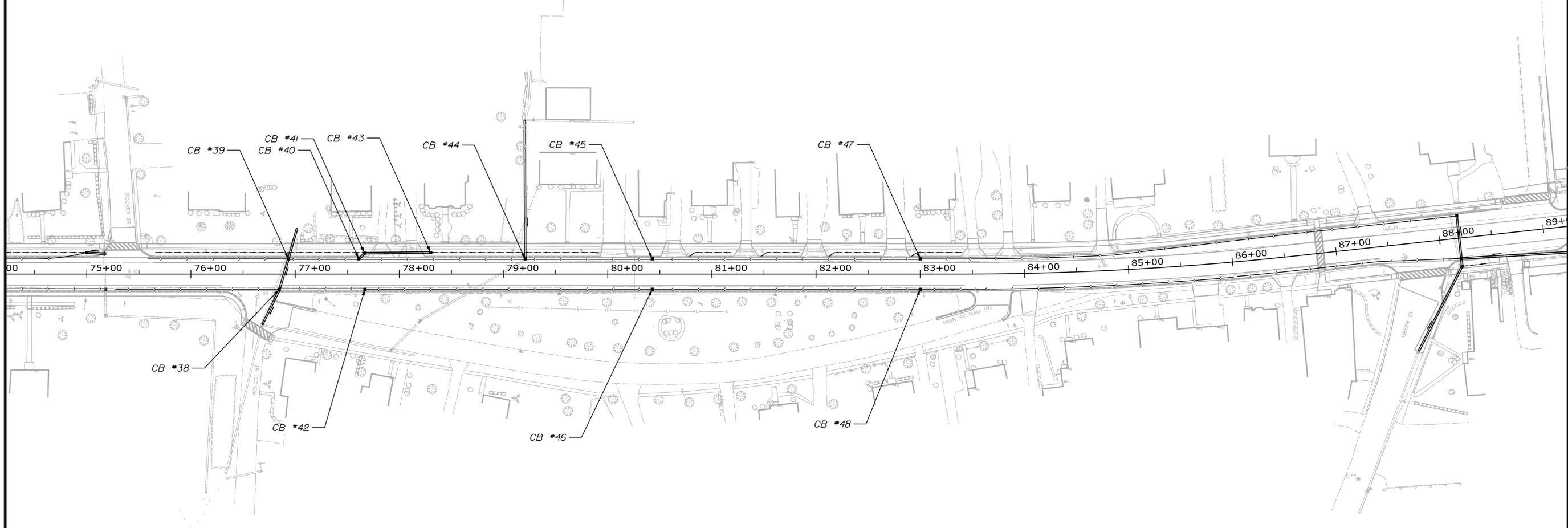
ID	Station	Area (ac)	Rational C	TC (min)	Flow (cfs)	Spread (ft)
CB #38	76+85, RT	0.07	0.9	5	0.33	1.14
CB #39	76+93, LT	0.06	0.9	5	0.27	0.83
CB #40	77+67, LT	0.48	0.4	8	0.88	6.9
CB #41	77+67, LT	0.06	0.8	5	0.24	0.79
CB #42	77+67, RT	0.14	0.9	5	0.66	4.34
CB #43	78+30, LT	0.05	0.8	5	0.19	0.73
CB #44	79+21, LT	0.26	0.55	8	0.65	8.39
CB #45	80+43, LT	0.2	0.9	5	0.95	8.08
CB #46	80+43, RT	0.11	0.9	5	0.52	4.71
CB #47	83+00, LT	0.52	0.55	8	1.31	7.43
CB #48	83+00, RT	0.1	0.9	5	0.47	4.59

**Table 4.9 - System 5 Catch Basin Summary**

Pipe	Design Storm (yr)	Diameter (in)	flow (cfs)	Slope (ft/ft)	n	capacity (cfs)
CB #38 - existing CB	50	36	50.2	0.006	0.013	51.8
CB #39 - CB #38	50	36	50.2	0.006	0.013	51.8
CB #42 - CB #38	10	15	1.66	0.005	0.013	4.57
CB #40 - CB #39	50	24	11.7	0.005	0.013	29.08
CB #41 - CB #40	10	12	0.43	0.005	0.013	2.52
CB #43 - CB #41	10	12	0.19	0.005	0.013	2.52
CB #44 - CB #40	50	24	11.7	0.005	0.013	29.08
CB #45 - CB #44	10	15	1.8	0.005	0.013	4.57
CB #46 - CB #42	10	12	0.9	0.005	0.013	2.52
CB #47 - CB #45	10	12	0.86	0.017	0.013	4.56
CB #48 - CB #46	10	12	0.36	0.018	0.013	4.74
Inlet - CB #39	50	24	38.5	0.02	0.013	32.07*
Inlet - CB #44	50	24	11.7	0.005	0.013	29.08*

**Table 4.10 - System 5 Hydraulics**





SHEET NUMBER  
**4.20**

**THOMASTON  
ROUTE 1**

**FIGURE 14 - SYSTEM 5 LAYOUT**

PROJ. MANAGER	E. MARTIN	BY		DATE	
DESIGN DETAILED	T. LUTHER	CHECKED	G. SANTY	2/28/14	SIGNATURE
DESIGNS DETAILED	J. WAINWRIGHT	DESIGNS DETAILED	P. ARMITA		P.E. NUMBER
REVISIONS 1		REVISIONS 2			DATE
REVISIONS 3		REVISIONS 4			
FIELD CHANGES					

STATE OF MAINE  
DEPARTMENT OF TRANSPORTATION

**STP-1789(000)X**

PIN  
17890.00

HIGHWAY PLANS

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Closed Drainage Systems  
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### 4.6 SYSTEM 6

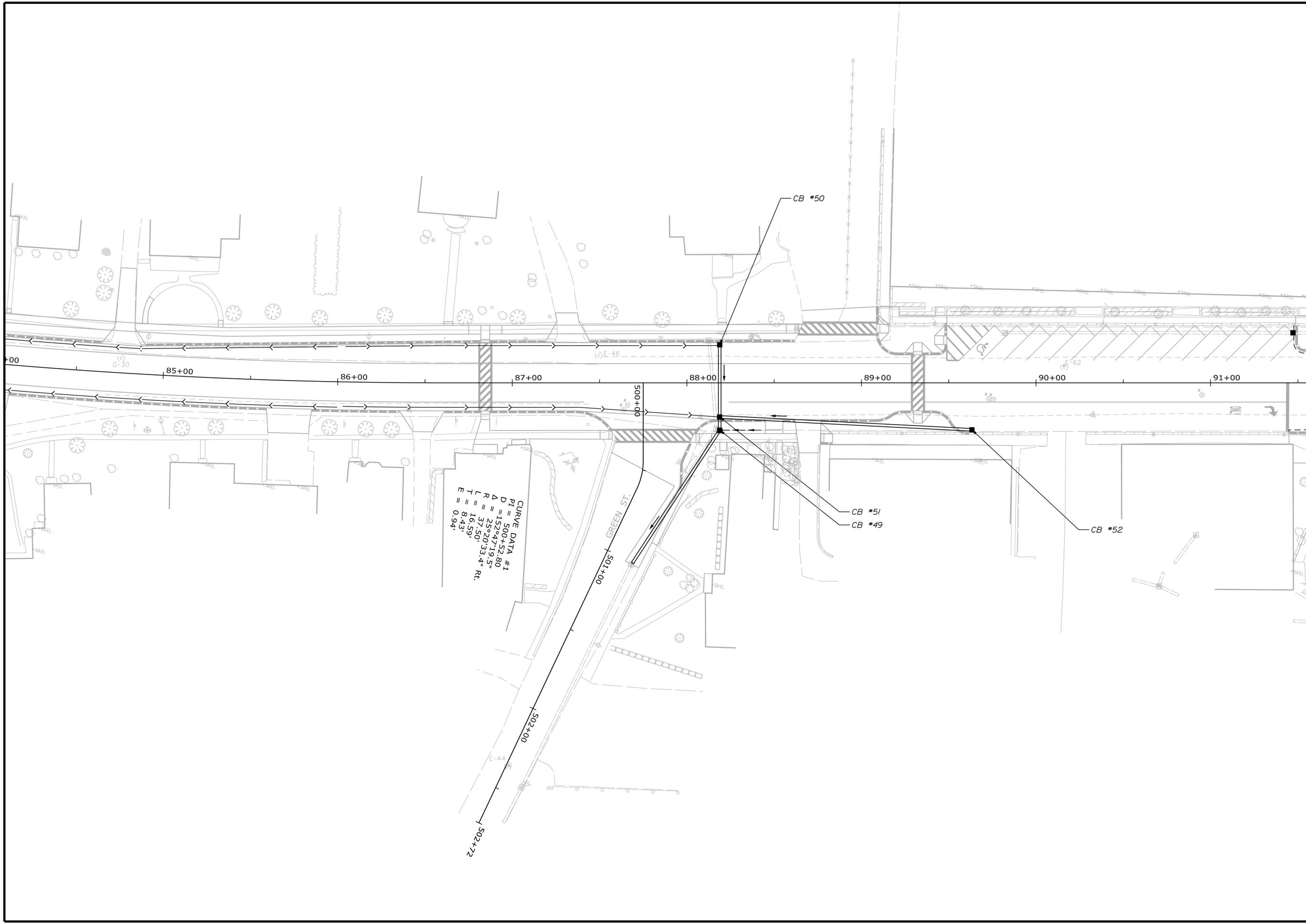
System 6 consists of catch basins collecting drainage along Route 1 from the highpoint at 85+94 to the highpoint at 90+56. The proposed system will be almost identical with to the existing system with the exception of the added catch basin at 89+63 RT to capture runoff that would otherwise be trapped by the proposed curb bulb out. The system connects to the existing system along Green Street.

ID	Station	Area (ac)	Rational C	TC (min)	Flow (cfs)	Spread (ft)
CB #49	88+20, RT	0.02	0.8	5	0.06	0.48
CB #50	88+19, LT	2.6	0.9	5	3.8	10.25
CB #51	88+19, RT	0.13	0.9	5	0.5	2.83
CB #52	89+63, RT	0.07	0.9	5	0.29	0.85

**Table 4.11 - System 6 Catch Basin Summary**

Pipe	Design Storm (yr)	Diameter (in)	flow (cfs)	Slope (ft/ft)	n	capacity (cfs)
CB #49 - existing CB	10	24	4.29	0.026	0.013	38.28
CB #51 - CB #49	10	18	4.26	0.015	0.013	12.87
CB #50 - CB #51	10	18	0.55	0.015	0.013	4.36
CB #52 - CB #51	10	12	0.29	0.01	0.013	3.56

**Table 4.12 - System 6 Hydraulics**



STATE OF MAINE DEPARTMENT OF TRANSPORTATION		STP-1789(000)X	
THOMASTON ROUTE 1		FIGURE 15 - SYSTEM 6 LAYOUT	
SHEET NUMBER		4.22	
PROJ. MANAGER	E. MARTIN	BY	DATE
DESIGN-DETAILED	T. LUTHER	CHECKED-REVIEWED	G. SANTY
DESIGNS-DETAILED	J. MAYNARD	DESIGNS-DETAILED	P. ARAMATA
REVISIONS 1		REVISIONS 2	
REVISIONS 3		REVISIONS 4	
FIELD CHANGES			
SIGNATURE		P.E. NUMBER	
DATE		DATE	
PIN		HIGHWAY PLANS	
17890.00			

## 17890.00 THOMASTON DRAINAGE REPORT

Closed Drainage Systems  
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### 4.7 SYSTEM 7

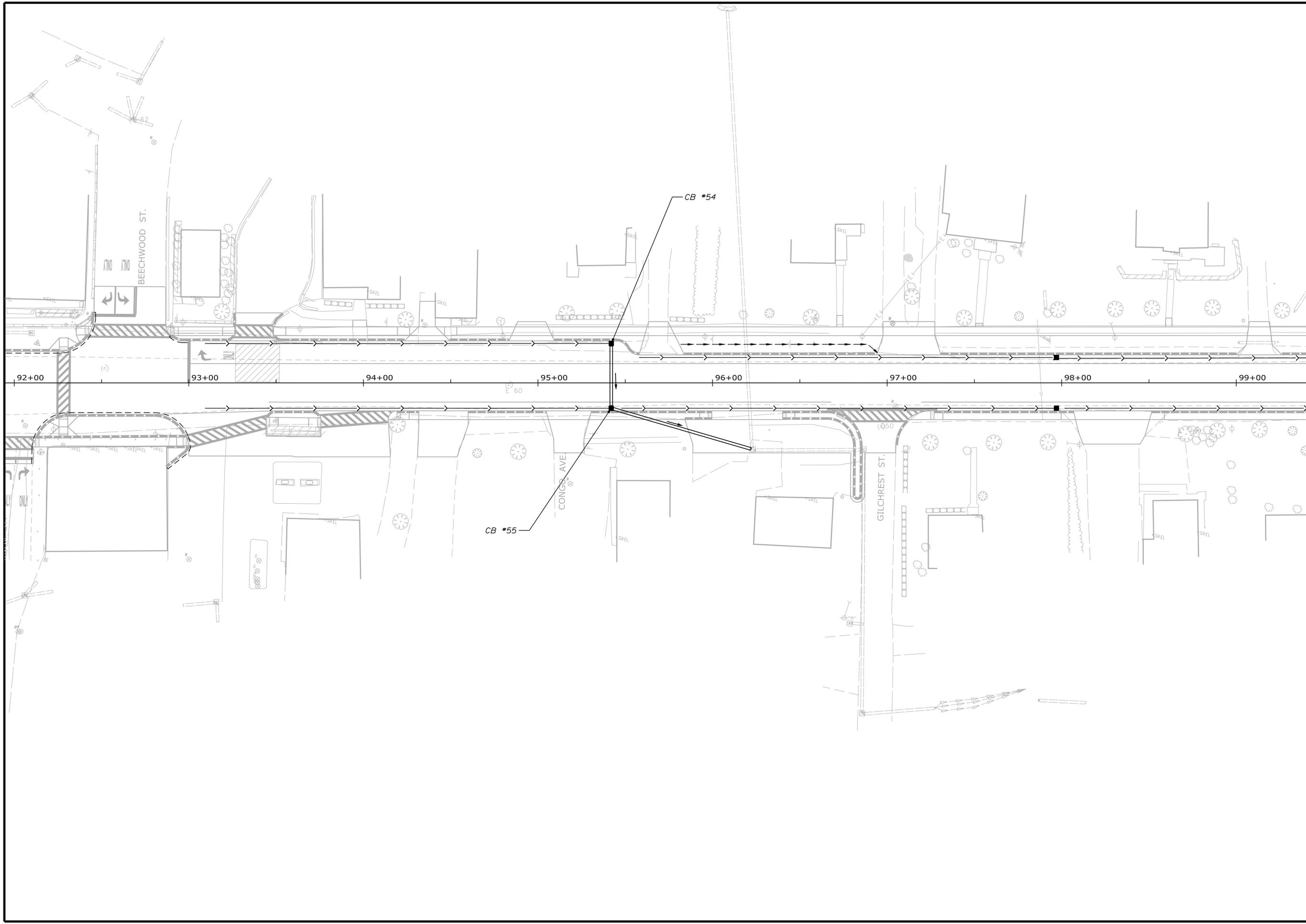
System 7 consists of catch basins collecting drainage along Route 1 from the highpoint at 90+56 to the crossing at 96+20. The proposed system consists of two catch basins and connects to the existing catch basin at 96+20 and outlets through the existing system along Gilcrest Street.

ID	Station	Area (ac)	Rational C	TC (min)	Flow (cfs)	Spread (ft)
CB54	95+42, LT	0.36	0.82	8	1.35	9.47
CB55	95+42, RT	0.15	0.9	5	0.71	5.79

**Table 4.13 - System 7 Catch Basin Summary**

Pipe	Design Storm (yr)	Diameter (in)	flow (cfs)	Slope (ft/ft)	n	capacity (cfs)
CB54 – CB55	10	18	1.19	0.015	0.013	4.36
CB55 - existing CB	10	18	1.56	0.02	0.013	5.09

**Table 4.14 - System 7 Hydraulics**



STATE OF MAINE DEPARTMENT OF TRANSPORTATION <b>STP-1789(000)X</b>		SHEET NUMBER <b>4.24</b>	
		THOMASTON ROUTE 1 <b>FIGURE 16 - SYSTEM 7 LAYOUT</b>	
PROJ. MANAGER E. MARTIN	BY T. LUTHER	DATE 2/28/14	SIGNATURE
DESIGN DETAILED G. SANTY	CHECKED-REVIEWED J. WARD	DESIGN DETAILED P. ARMATA	P.E. NUMBER
REVISIONS 1	REVISIONS 2	REVISIONS 3	DATE
REVISIONS 4	FIELD CHANGES	PIN 17890.00	HIGHWAY PLANS

# 17890.00 THOMASTON DRAINAGE REPORT

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## 4.8 SYSTEM 8

System 8 consists of catch basins collecting drainage along Route 1 from the crossing at 96+20 to the highpoint at 103+14. The proposed system will combine with the crossing at 101+20 and outlet to the same channel as the existing crossing.

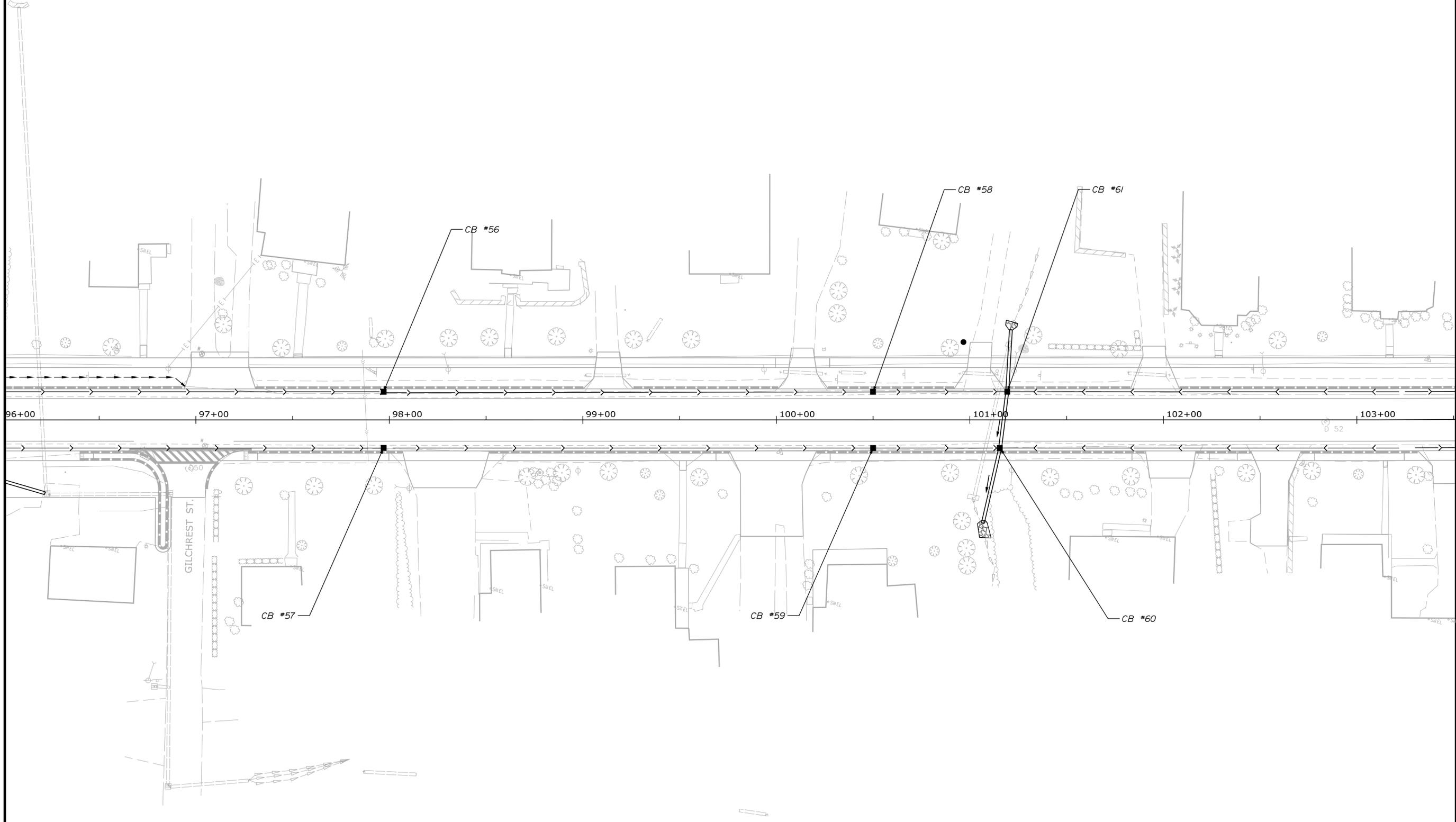
ID	Station	Area (ac)	Rational C	TC (min)	Flow (cfs)	Spread (ft)
CB #56	97+97, LT	0.48	0.4	6	0.96	7.48
CB #57	97+97, RT	0.16	0.9	5	0.76	7.61
CB #58	100+50, LT	0.9	0.4	6	1.8	5.27
CB #59	100+50, RT	0.14	0.9	5	0.66	4.26
CB #60	101+16, RT	0.08	0.9	5	0.38	0.9
CB #61	101+19, LT	0.28	0.4	6	0.56	1.05

**Table 4.15 - System 8 Catch Basin Summary**

Pipe	Design Storm (yr)	Diameter (in)	flow (cfs)	Slope (ft/ft)	n	capacity (cfs)
CB #56 - CB #58	10	12	0.48	0.005	0.013	2.52
CB #57 - CB #59	10	12	0.51	0.005	0.013	2.52
CB #58 - CB #61	10	15	2.25	0.005	0.013	4.57
CB #59 - CB #60	10	15	1.39	0.005	0.013	4.57
CB #61 - CB #60	50	24	See Crossing Hydraulics Section			
CB #60 - Outlet	50	24	See Crossing Hydraulics Section			
Inlet - CB #61	50	24	See Crossing Hydraulics Section			

**Table 4.16 - System 8 Hydraulics**





STATE OF MAINE DEPARTMENT OF TRANSPORTATION		STP-1789(000)X	
PIN 17890.00		HIGHWAY PLANS	
THOMASTON ROUTE 1		FIGURE 17 - SYSTEM 8 LAYOUT	
SHEET NUMBER <b>4.26</b>		FIELD CHANGES	
PROJ. MANAGER	E. MARTIN	BY	DATE
DESIGN DETAILED	T. LUTHER	CHECKED	2/28/14
DESIGN REVIEWED	G. SANTY	DESIGNED	
DESIGN DETAILED	J. WAINWRIGHT	DESIGNED	
DESIGN DETAILED	P. ARMATA	DESIGNED	
REVISIONS 1		P.E. NUMBER	
REVISIONS 2		DATE	
REVISIONS 3			
REVISIONS 4			

## 17890.00 THOMASTON DRAINAGE REPORT

Closed Drainage Systems  
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### 4.9 SYSTEM 9

System 9 consists of catch basins collecting drainage along Route 1 from the high point at 103+14 to the end of the project. The proposed system will outlet at 125+50, rt. The proposed outlet will shift East about 30' from the existing outlet to avoid existing utility poles. The discharge point remains the same. The existing outlet pipe is to be abandoned.

ID	Station	Area (ac)	Rational C	TC (min)	Flow (cfs)	Spread (ft)
CB #62	106+53, RT	0.07	0.9	5	0.30	3.11
CB #63	106+54, LT	0.24	0.83	5	0.93	3.98
CB #64	106+77, LT	1.3	0.4	10	1.92	1.60
CB #65	107+25, RT	0.14	0.9	5	0.66	3.79
CB #66	109+50, LT	1.85	0.4	9	2.85	7.45
CB #67	109+50, RT	0.14	0.9	5	0.66	4.53
CB #68	110+86, LT	0.1	0.9	5	0.42	6.21
CB #69	110+86, RT	0.22	0.9	5	0.93	4.68
CB #70	111+03, LT	2.5	0.4	15	3.57	3.95
CB #71	114+00, LT	0.39	0.4	8	0.63	2.85
CB #72	114+00, LT	0.16	0.9	5	0.68	5.08
CB #73	112+25, RT	0.08	0.9	5	0.34	3.81
CB #74	116+90, LT	0.58	0.43	8	1.00	4.46
CB #75	116+88, RT	0.36	0.9	5	1.72	4.82
CB #77	118+00, RT	0.07	0.9	5	0.29	3.52
CB #79	124+15, RT	0.20	0.9	5	0.83	1.26
CB #81	125+50, RT	0.12	0.9	5	0.51	3.13

**Table 4.17- System 9 Catch Basin Summary**

Pipe	Design Storm (yr)	Diameter (in)	flow (cfs)	Slope (ft/ft)	n	capacity (cfs)
CB #63 - CB #62	10	18	2.60	0.01	0.013	10.53
CB #62 - CB #65	10	18	2.82	0.024	0.013	16.31
CB #64 - CB #63	10	12	1.92	0.02	0.013	5.01
CB #65 - CB #67	10	18	3.29	0.016	0.013	13.18
CB #66 - CB #68	10	12	1.62	0.01	0.013	3.56
CB #67 - CB #69	10	18	3.31	0.012	0.013	11.32
CB #68 - CB #69	10	18	5.52	0.01	0.013	10.5
CB #69 - CB #73	10	18	8.98	0.012	0.013	11.35



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CB #70 - CB #68	10	12	3.09	0.05	0.013	7.99
CB #73 - CB #75	10	18	9.29	0.033	0.013	19.01
CB #72 - CB #74	10	12	1.56	0.034	0.013	6.55
CB #71 - CB #72	10	12	0.63	0.01	0.013	3.56
CB #74 - CB #75	10	18	2.53	0.01	0.013	10.5
CB #75 - CB #77	10	18	12.10	0.054	0.013	24.31
CB #77 - CB #79	10	18	12.43	0.053	0.013	24.07
CB #79 - CB #81	10	18	12.87	0.023	0.013	15.95
CB #81 - Outlet	10	18	13.23	0.017	0.013	14.86

**Table 4.18 - System 9 Hydraulics**

### 4.10 SYSTEM 10

System 10 consists of catch basins collecting drainage along Route 1 from 117+30, LT to the end of the project. The proposed system will outlet at 125+90, LT. System 10 allows for the existing crossing at 125+20 to be eliminated. Drainage will outlet to Mill River on the North side of Route 1.

#### System 10

ID	Station	Area (ac)	Rational C	TC (min)	Flow (cfs)	Spread (ft)
CB #76	119+45, LT	0.67	0.44	8	1.35	4.46
CB #78	123+08, LT	0.58	0.44	8	1.17	4.26
CB #80	125+19, LT	0.44	0.3	8	0.6	4.71
CB #82	125+89, LT	0.36	0.9	5	1.5	0.49

**Table 4.19 - System 10 Catch Basin Summary**

Pipe	Design Storm (yr)	Diameter (in)	flow (cfs)	Slope (ft/ft)	n	capacity (cfs)
CB #76 - CB #78	10	12	1.22	0.08	0.013	10.03
Inlet - CB #78	10	18	12.1	0.02	0.013	16.14
CB #78 - CB #80	10	18	14.53	0.05	0.013	25.51
CB #80 - CB #82	10	24	15.71	0.01	0.013	24.57
CB #82 - Outlet	10	24	17.21	0.01	0.013	24.57

**Table 4.20 - System 10 Hydraulics**

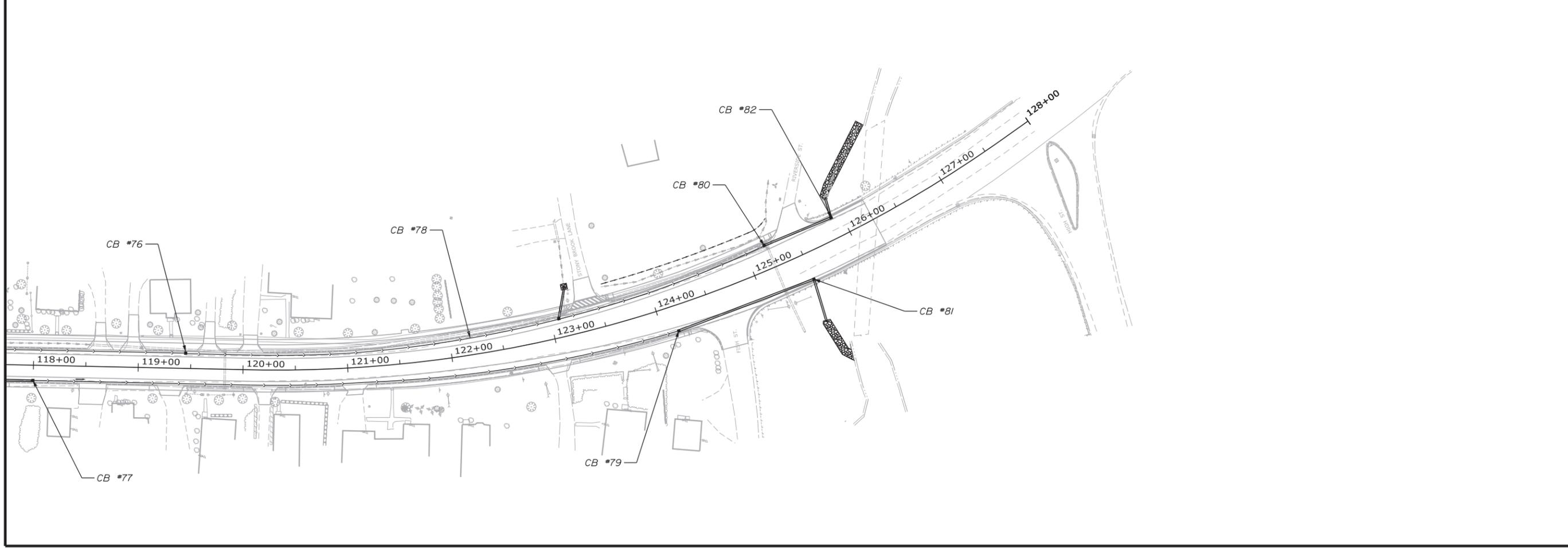
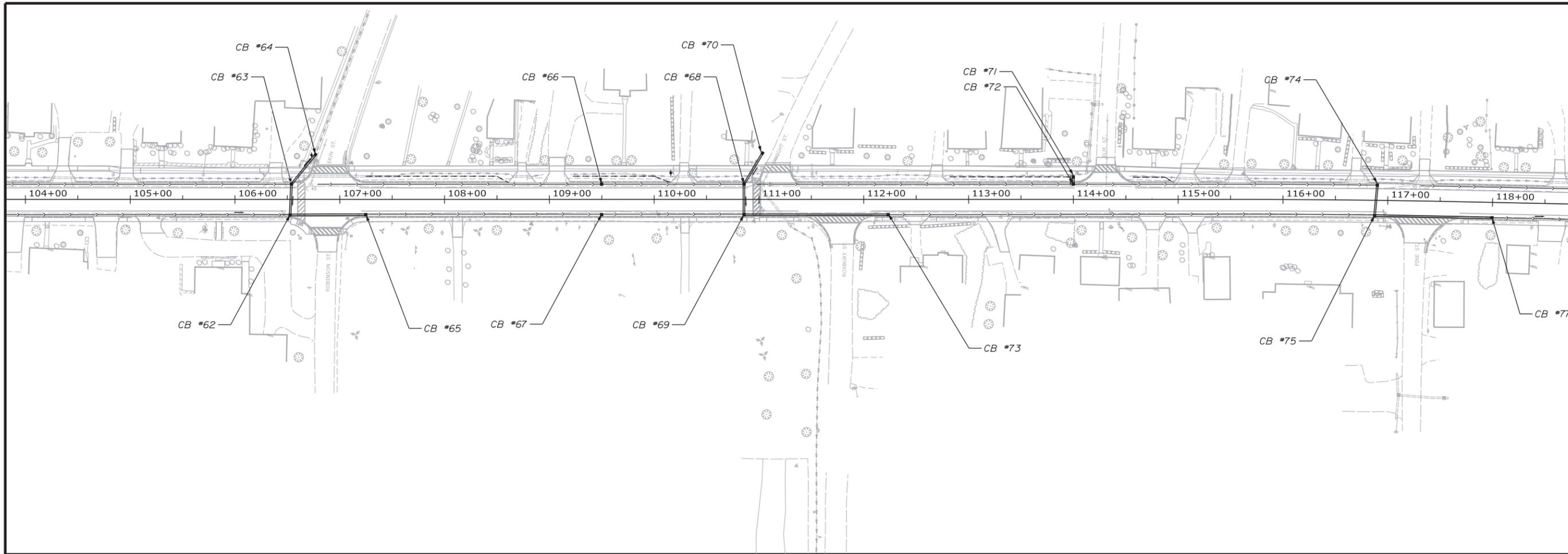


Date: 12/11/2014

Username: common

Division: HIGHWAY

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STATE OF MAINE DEPARTMENT OF TRANSPORTATION		STP-1789(000)X	
		PIN 17890.00	HIGHWAY PLANS
THOMASTON U.S. ROUTE 1		FIGURE 18 - SYSTEM 9 & 10 LAYOUT	
SHEET NUMBER		4.29	
	PROJ. MANAGER	E. MARTIN	DATE
	DESIGN-DETAILED	T. LUTHER	
	CHECKED-REVIEWED	G. SANTY	10/17/14
	DESIGNS-DETAILED	M. WYNER	
	DESIGNS-DETAILED	P. ARMATA	
	REVISIONS 1		
	REVISIONS 2		
	REVISIONS 3		
	REVISIONS 4		
	FIELD CHANGES		
			SIGNATURE
			P.E. NUMBER
			DATE