

July 27, 2009

Mr. Steve Bruns, City Engineer
City of Auburn
210 E. Ninth Street
Auburn, IN 46706

Subject: North Side Sewer Separation Study

Dear Mr. Bruns:

Bonar Group has revised the letter report dated July 8, 2009. The following letter report has been updated to include discussions that took place at a review meeting held on July 17, 2009.

Bonar Group is pleased to submit this following letter report to the City of Auburn on a feasibility study to evaluate sewer separation options for an area on the north side of the city. See **Figure 1** for the study area.

A sewer separation project was designed by Bonar Group in 1987 to serve this area; however, this project was never constructed. In February 2009, the City retained Bonar Group to re-evaluate the 1987 project to see if the proposed sanitary sewers could be constructed at an elevation higher than the existing combined sewer.

In May 2009, "Preliminary Investigation Comments" were shared with the City from Bonar Group which addressed concerns for using the 1987 design and provided an initial alternative design approach and ideas for separating the combined sewer system (see **Exhibit 1**). This document was in a preliminary form and included items that needed to be further refined. At that point, the City requested that Bonar Group pursue studying the alternate approach and also expanded the scope to include the area on the west side of Main Street.

Much of the basis of this study is based on information provided by the 1987 design, such as grades and invert elevations of the existing sewers. Other information such as recent sewer improvements, shed maps, sewer videos and utilities were based on the information provided by the City.

PURPOSE

The purpose of this study is to develop a phased approach to separating the combined sewers by adding new storm sewers and sanitary sewers. The separating of these sewers will gradually allow other areas outside of the study area to be separated allowing for elimination of existing CSO's.

STUDY AREA

The study area is divided into two sub-areas: east of Main Street and west of Main Street (see **Figure 1**). At the direction of the City, separate projects have been developed for each area. The east side project is referred to as Phase 1, which is a stand-alone project. The west side project is referred to as Phase 2, and is dependent on Phase 1.

MODELING

Storm water modeling (Storm CAD®) was performed using a 10-year storm event, a runoff coefficient of 0.50, a time of concentration of 60 minutes and an "n" factor of 0.013 for proposed and existing PVC and concrete pipes.

It's a Matter of Trust.



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PROJECT DEVELOPMENT

Phase 1 – East of Main Street

The recommended improvements (see **Figure 2**) are as follows:

- New storm sewers would be installed.
- The existing combined sewers would be left in place to serve as sanitary sewers, after all the inlets and other known points of inflow are eliminated from the existing combined sewers.
- The converted sanitary sewers and manholes would be lined to provide structural integrity, in addition to eliminating infiltration. Point repairs of the existing sewers may be required to provide unobstructed installation of the lining.
- New sanitary sewers would be installed.

The new storm sewers would connect to an existing 33" storm sewer along Harrison Street which ultimately discharges into Cedar Creek south of Clinton Street. Based on storm water modeling, the existing storm sewers and outfall have sufficient capacity to handle the additional storm water collected from the proposed Phase 1 storm sewers, for a 10-year storm, without surcharging.

The sanitary sewers would flow south along Main Street, where a new sanitary sewer would intercept the sewer at North Street and extend half a block west to connect to an existing sanitary sewer. New sanitary sewers would also be included on Cedar Street from Carlin Street south to existing manhole south of Union Street and on Carlin Street from Main Street to Union Street. The sanitary sewer lateral from the park restroom, located west of Union Street, would be directed to either Cedar Street or Carlin Street. This would provide complete separation for the Phase 1 area.

Phase 2 – West of Main Street

The recommended improvements (see **Figure 3**) are as follows:

- New storm sewers would be installed. The new storm sewers would connect to the Phase 1 storm sewers, with the exception of a new storm sewer along Midway, which would be routed to the existing 18" combined sewer along North Street.
- The existing combined sewers would be left in place to serve as sanitary sewers, after all the inlets and other known points of inflow are eliminated from the existing combined sewers. The exception would be the section of existing combined sewer along Van Buren Street from North Street north to the curve. This section will be converted to a storm sewer.
- The converted sewers and manholes would be lined to provide structural integrity, in addition to eliminating infiltration. Point repairs of the existing sewers may be required to provide unobstructed installation of the lining.
- A conflict structure would likely be required at the intersection of Midway Street and Prospect Street due to elevation conflicts between the existing sewer and the proposed storm sewer.
- At the request of the City, a new sanitary sewer was also included along Van Buren Street to a depth that would allow for a future extension to serve a church and potential development located approximately 1,000 feet west of Van Buren Street and Prospect Street (see **Figure 4**). The new sanitary sewer would allow the current combined sewer in this area to be converted to a storm sewer.
- Plug existing 12" sewer.
- Remove plug on abandoned 24" combination sewer to allow for new storm water outfall.

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The Phase 1 storm sewers are sized to accommodate flows from Phase 2. Based on storm water modeling, the existing storm sewers and outfall have sufficient capacity to handle the additional storm water collected from the proposed storm sewers in Phase 1 and Phase 2, for a 10-year storm, without surcharging.

By separating the combined sewers in Phase 2, a large amount of combined sewage would be removed from the existing 18" combined sewer along North Street. With the work proposed, it is the City's opinion that based on information known about the sewer system in the study area the improvements recommended would eliminate all sanitary sewers from this line allowing this line to serve as a storm sewer.

COST ESTIMATES

Cost estimates were prepared for Phases 1 and 2. The cost estimates include costs for the new storm sewers, gravity sewers, manholes, pipe lining, manhole rehabilitation, and non-construction costs. Detailed cost estimates for each phase are shown on **Tables 1 and 2**. The cost summary for each phase is shown below.

Phase 1 – \$ 1,120,000
Phase 2 – \$ 880,000

If you have any questions, please feel free to call to discuss them.

Sincerely,



Mark B. Jesse
Vice President
260.969.8822



Cheryle Culler, PE
Project Engineer
260.969.8837

ATTACHMENTS:

- Exhibit 1 – Preliminary Investigation Comments
- Figure 1 – Study Area
- Figure 2 – Phase 1 Sewer Separation Project
- Figure 3 – Phase 2 Sewer Separation Project
- Figure 4 – Sanitary Sewer Extension to Church and Future Development
- Table 1 – Phase 1 Estimated Total Project Cost
- Table 2 – Phase 2 Estimated Total Project Cost

EXHIBIT 1

Auburn Sewer Separation Study

Preliminary Investigation Phase 1 Comments:

May 2009

Raising the proposed sanitary sewer:

The existing combined sewers along Washington, Jefferson and Madison have 4' to 5' of cover. The sanitary sewers proposed in 1987 are shown approximately 1.5' to 2' below bottom of existing sewers. This will provide enough clearance to allow laterals to be extended to the new sanitary sewers from either side of the road. If the proposed sanitary sewer is to be raised it would have to be raised above the existing combined sewer to allow the laterals to go over the existing combined sewer into the proposed sanitary sewer. This would only allow approximately 3' to 4' of cover. Laterals extending from the properties are typically buried 3' to 4' coming out of the homes and then have a 1% to 2% slope. Therefore if the sanitary sewer is raised above the existing combined sewer it may be too shallow to serve the homes. Potholing existing laterals would provide information to see if laterals could be connected to a higher sanitary sewer. We don't have first floor elevations so it's hard to determine slope of the land. Also at this shallow depth we will likely have more conflicts with existing utilities and water services.

Concerns:

Proposed sanitary sewers are shown 10" and larger. IDEM does not allow a 10" sanitary sewer which only serves a dozen or so houses on each street. These plans are 22 years old....perhaps IDEM didn't have all the regulations in place as they do now. I believe 10" and 12" sewers were used to allow the pipe to be installed at a flatter grade. I spoke with IDEM concerning using the larger sanitary sewer for such a few homes. D.S. Pattel with IDEM stated that they would need a letter from the City stating that they understand the maintenance issues associated with the use of larger pipes with flatter slopes resulting in very low velocities causing settlement in the sewers. The bottom line is that the sewers will never have enough velocity to scour the pipes because they will never flow full. If we use an 8" pipe at minimum slope we will be about 2' to 3' too deep at the proposed connection point to serve the out reaches as previously planned.

EXHIBIT 1

Other future project areas along Van Buren Street show proposed 15" sanitary sewers with only a dozen or so homes on dead end streets. Hopefully the overall concept of this project is not based on serving future project areas otherwise there could be problems.

The sanitary sewer layout along Madison Street will not serve all of the sanitary sewer connections that are needed. The plans show the proposed sanitary sewer terminating approximately 500' south of Main Street and then plugging the existing combo sewer at this point. There are about 6 homes on this line shown to be abandoned to the east. We will need to extend the proposed sanitary sewer at least another 200' east.

The total project cost based on the 1987 plans is \$1,060,000 (**See Table 1**).

The existing 10" and 12" clay pipes will be left in place to serve as storm sewers. This is severely undersized for storm sewers for such a large area. Dave Lockner with the City (Wastewater Supt.) said that there has been several complaints about standing water during rain events along our study area. The televising was done 13 years ago and we have a concern that the sewers are in much worse condition. The majority of the pipe joints had roots. The City has a root cutter but they typically don't use it unless they absolutely have to.

If we use the existing combined sewer as a sanitary sewer and install new storm sewers then our concern is that the existing pipes are not in good enough condition and to large resulting in very low velocities. This would be an ongoing maintenance problem.

The number of service laterals total 132 as noted in the televising logs which is quite a bit different compared to 55 as shown on the drawings (Big cost difference!). There are approximately 72 homes/businesses along the proposed routes. It also appears that there are service laterals at empty lots. Some of homes may be duplexes' or multiple businesses in one large building. Of the 132 laterals, 79 have manufactured taps at the main line sewer which tells us they are active and newer.

EXHIBIT 1

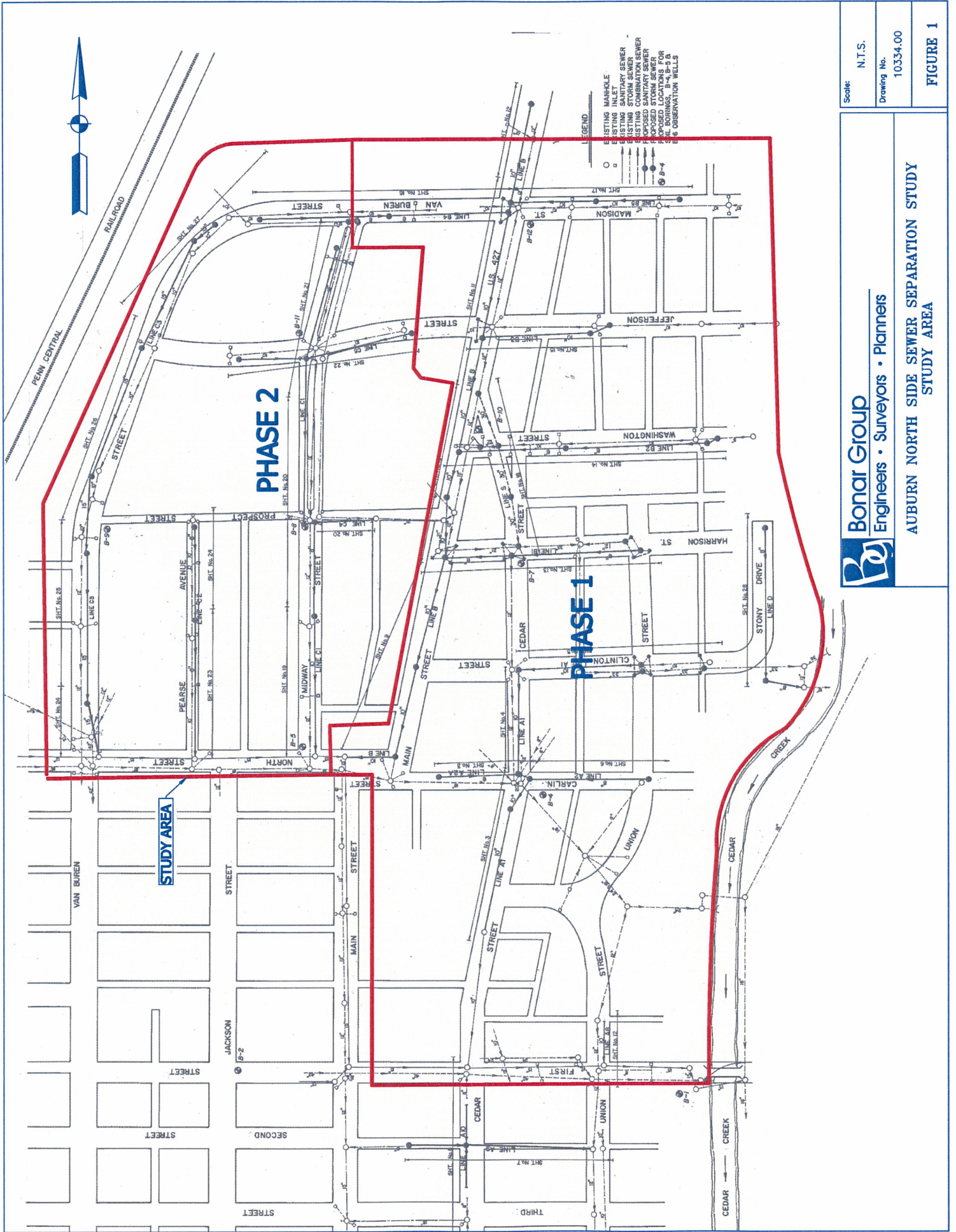
Alternative Design

To solve those problems as mentioned above we would recommend lining the existing combined sewer to continue to be used as a sanitary sewer. Sanitary laterals could also be video inspected, cleaned, and cleared of roots if needed. The advantages are:


- Lining this sewer will eliminate failing joints and pipe sections while providing structural integrity.
- The flow characteristics will be greatly increased
- The liner will also eliminate much of the open cutting that would be done along Main Street resulting in a considerable cost savings.
- Service laterals would not be impacted and would be cut open with a robotic cutter
- The storm sewers would be sized to provide more benefit than the existing 10" & 12" sewers if a new sanitary sewer was constructed

New storm sewers would need to be installed to intercept existing inlets so the combined sewers in the project area would be dedicated sanitary sewers.

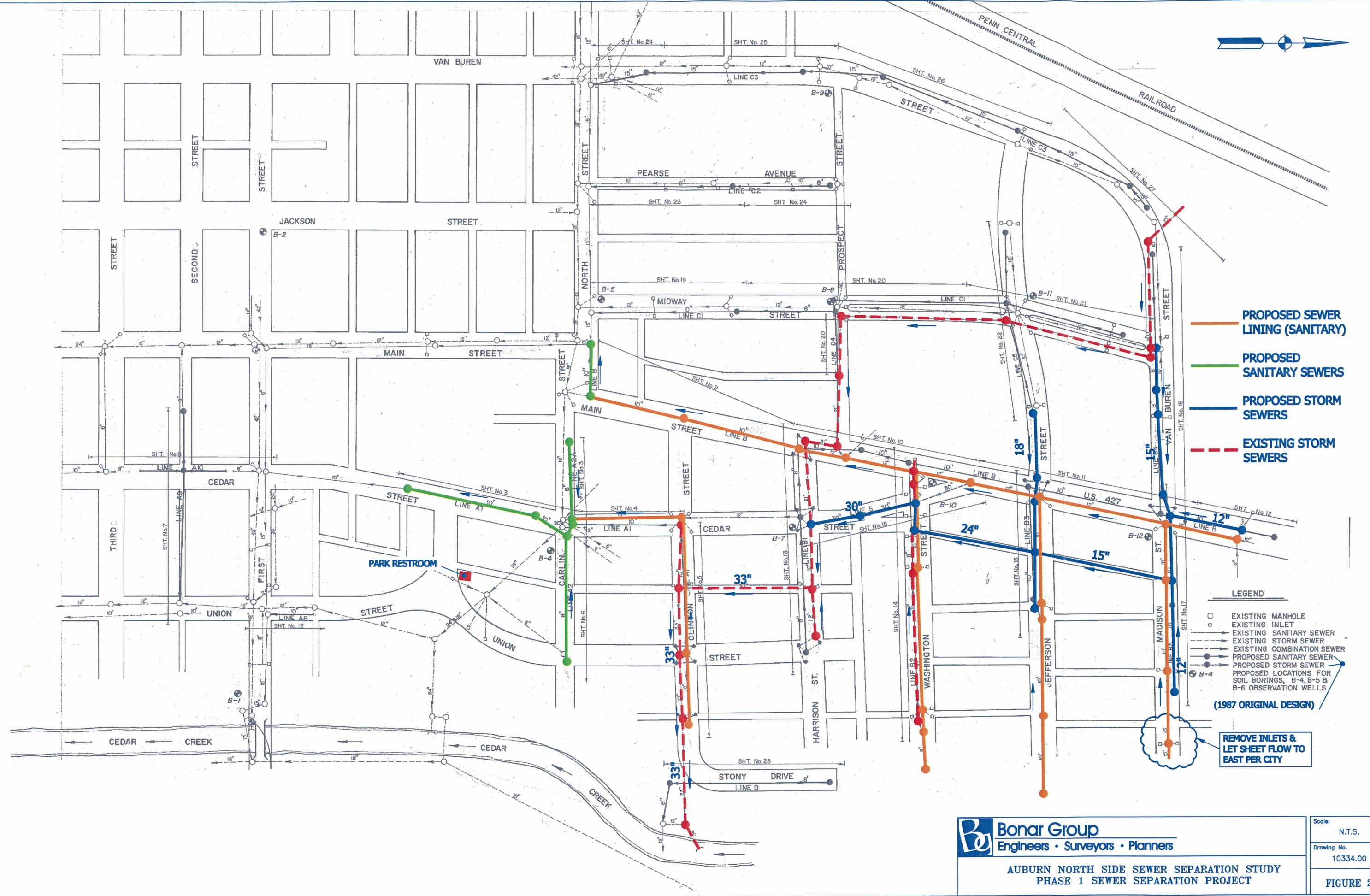
The estimated total project cost to install new storm sewers and line the existing sewer is \$860,000 (**See Table 2**). Costs to line the laterals have not been included. Laterals are generally considered private property. Also due to the unknown condition of the laterals it would be difficult to determine if the pipe could be properly lined.

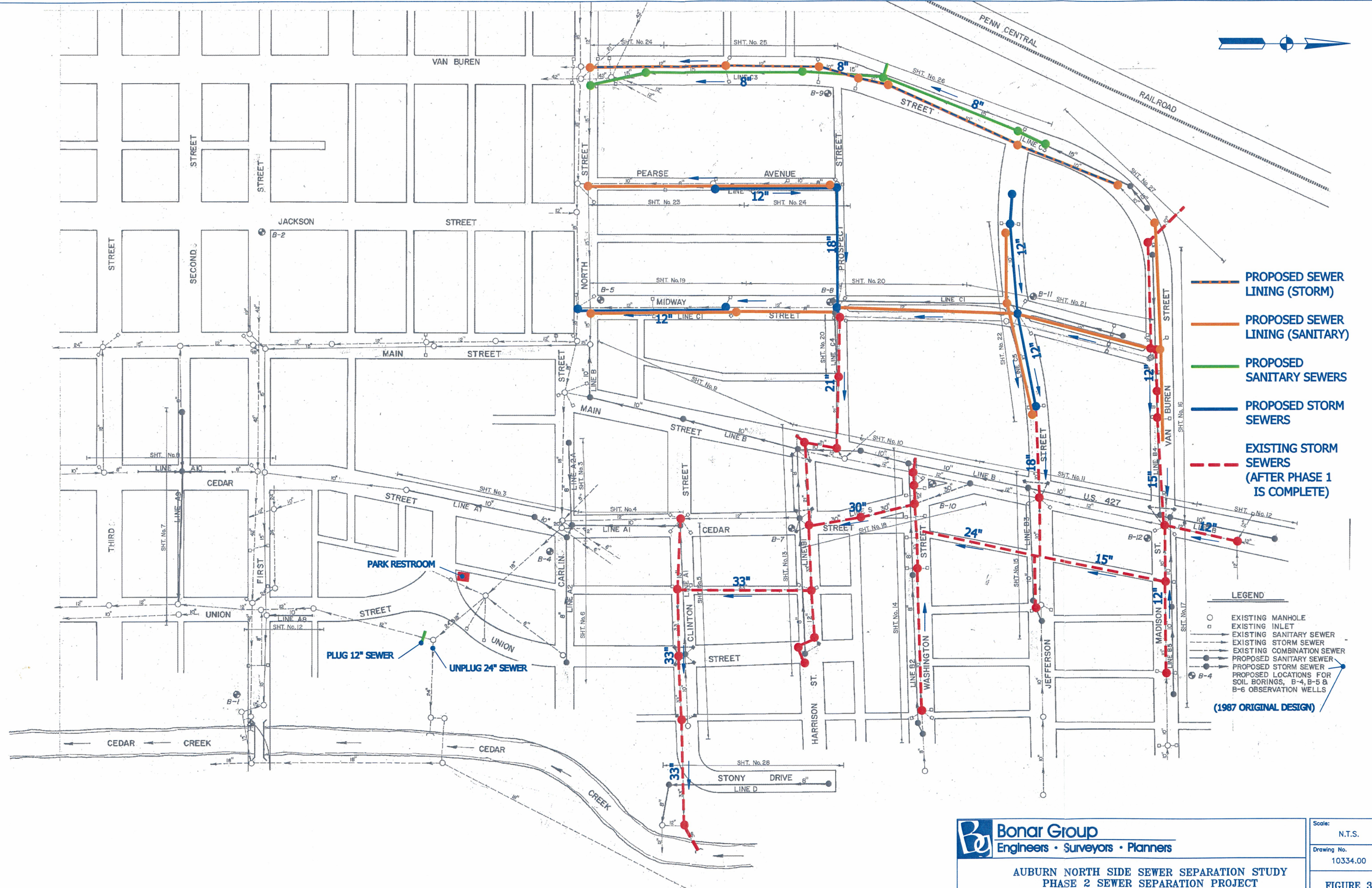


Scale:	N.T.S.
Drawing No.	10334.00
FIGURE 1	


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AUBURN NORTH SIDE SEWER SEPARATION STUDY
STUDY AREA

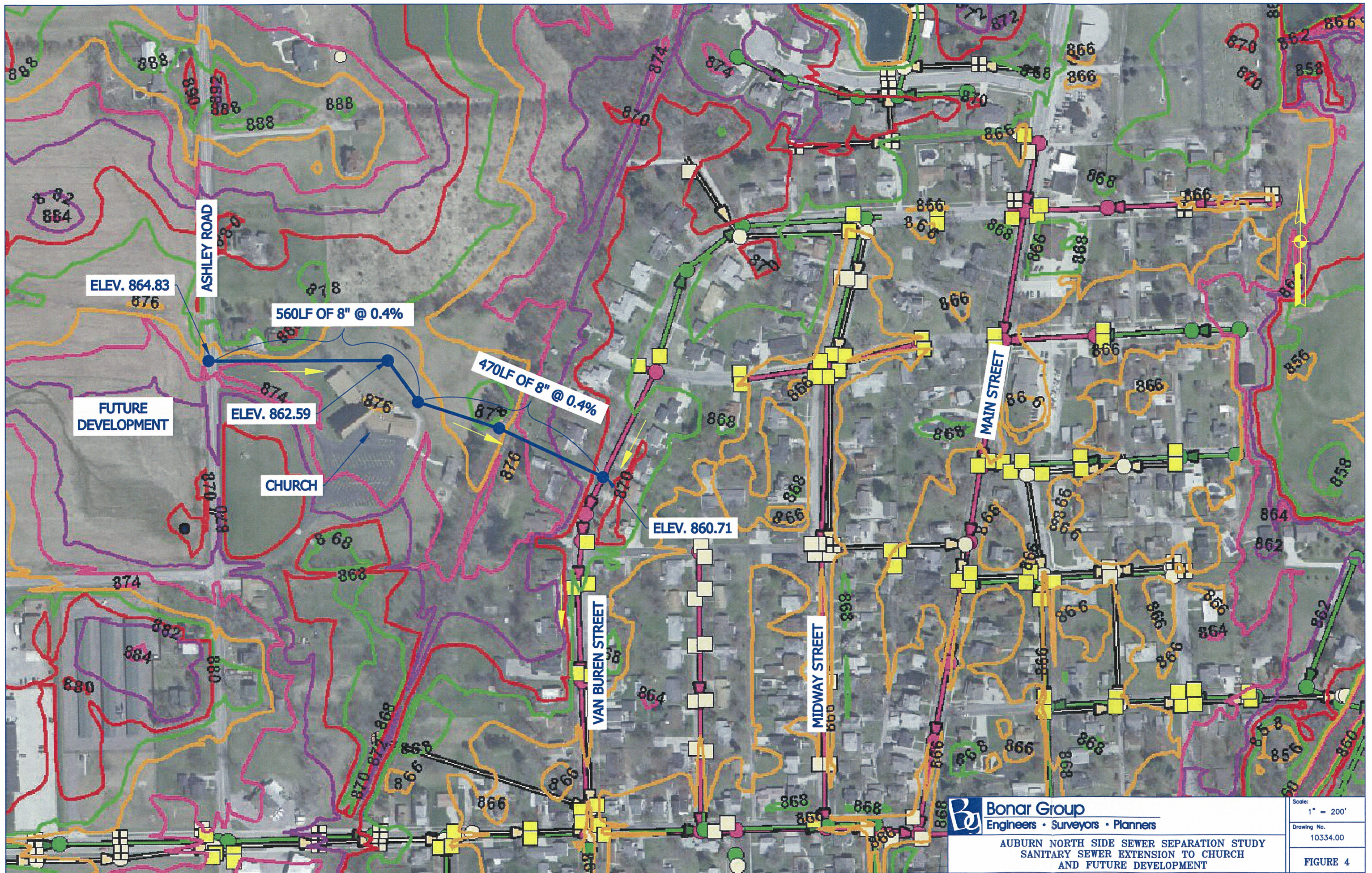




- PROPOSED SEWER LINING (STORM)
- PROPOSED SEWER LINING (SANITARY)
- PROPOSED SANITARY SEWERS
- PROPOSED STORM SEWERS
- EXISTING STORM SEWERS (AFTER PHASE 1 IS COMPLETE)

- LEGEND**
- EXISTING MANHOLE
 - EXISTING INLET
 - EXISTING SANITARY SEWER
 - EXISTING STORM SEWER
 - EXISTING COMBINATION SEWER
 - PROPOSED SANITARY SEWER
 - PROPOSED STORM SEWER
 - PROPOSED LOCATIONS FOR SOIL BORINGS, B-4, B-5 & B-6 OBSERVATION WELLS
- (1987 ORIGINAL DESIGN)

Bonar Group Engineers • Surveyors • Planners	Scale: N.T.S.
	Drawing No. 10334.00
AUBURN NORTH SIDE SEWER SEPARATION STUDY PHASE 2 SEWER SEPARATION PROJECT	
FIGURE 3	



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AUBURN NORTH SIDE SEWER SEPARATION STUDY
 SANITARY SEWER EXTENSION TO CHURCH
 AND FUTURE DEVELOPMENT

Scale: 1" = 200'
 Drawing No. 10334.00
 FIGURE 4

TABLE 1

**PHASE 1
ESTIMATED TOTAL PROJECT COST**

AUBURN NORTH SIDE SEWER SEPARATION STUDY

NO.	DESCRIPTION	QUANTITY	UNIT PRICE	EXTENSION
1	MOBILIZATION / DEMOBILIZATION	1 L.S.	\$37,000	\$37,000
2	TRAFFIC CONTROL	1 L.S.	\$8,000	\$8,000
3	CURED-IN-PLACE LINER	4500 LF	\$35	\$157,500
4	8", SANITARY	1100 L.F.	\$60	\$66,000
5	6", SANITARY SEWER LATERALS	7 EA	\$1,200	\$8,400
6	12", STORM	1100 L.F.	\$35	\$38,500
7	15", STORM	730 L.F.	\$40	\$29,200
8	18", STORM	360 L.F.	\$45	\$16,200
9	24", STORM	430 L.F.	\$50	\$21,500
10	30", STORM	290 L.F.	\$60	\$17,400
11	MANHOLES	24 EA	\$2,300	\$55,200
12	INLETS	21 EA	\$1,500	\$31,500
13	MANHOLE LINING	19 EA	\$2,000	\$38,000
14	COMPACTED AGGREGATE # 53/73	350 C.Y.	\$25	\$8,750
15	SPECIAL BACKFILL (B-BORROW)	2500 C.Y.	\$20	\$50,000
16	BITUMINOUS MIXTURE FOR PATCHING, 6" DEPTH	2700 S.Y.	\$45	\$121,500
17	CONCRETE PAVING, 6" DEPTH	750 S.Y.	\$60	\$45,000
18	POINT REPAIRS TO SEWER PRIOR TO LINING	1 L.S.	\$7,000	\$7,000
19	RESTORATION	1 L.S.	\$5,000	\$5,000
20	WATER MAIN RELOCATE	7 EA	\$1,800	\$12,600
	Sub-Total			\$774,250
	Construction Contingency (20%)			\$154,850
	Total Construction Costs (rounded up to nearest \$10,000)			\$930,000
	Total Non-Construction Costs (engineering, inspection, etc.)			\$186,000
	TOTAL PROJECT COSTS (rounded up to nearest \$10,000)			\$1,120,000

TABLE 2

PHASE 2
ESTIMATED TOTAL PROJECT COST

AUBURN NORTH SIDE SEWER SEPARATION STUDY

NO.	DESCRIPTION	QUANTITY	UNIT PRICE	EXTENSION
1	MOBILIZATION / DEMOBILIZATION	1 L.S.	\$29,000	\$29,000
2	TRAFFIC CONTROL	1 L.S.	\$5,000	\$5,000
3	CURED-IN-PLACE LINER	3491 LF	\$35	\$122,185
4	8", SANITARY	1335 L.F.	\$45	\$60,075
5	6", SANITARY SEWER LATERALS	30 EA	\$1,200	\$36,000
6	18", STORM	580 L.F.	\$45	\$26,100
7	12", STORM	1129 L.F.	\$35	\$39,515
8	MANHOLES	21 EA	\$2,300	\$48,300
9	CONFLICT STRUCTURE	1 EA	\$6,000	\$6,000
10	INLETS	23 EA	\$1,500	\$34,500
11	MANHOLE REMOVAL	3 EA	\$1,500	\$4,500
12	MANHOLE LINING	15 EA	\$1,700	\$25,500
13	MANHOLE MODIFICATIONS (Plug / Unplug)	1 LS	\$1,000	\$1,000
14	COMPACTED AGGREGATE # 53/73	225 C.Y.	\$25	\$5,625
15	SPECIAL BACKFILL (B-BORROW)	2500 C.Y.	\$20	\$50,000
16	BITUMINOUS MIXTURE FOR PATCHING, 6" DEPTH	1900 S.Y.	\$45	\$85,500
17	POINT REPAIRS TO SEWER PRIOR TO LINING	1 L.S.	\$8,000	\$8,000
18	SEEDING AND RESTORATION	1 L.S.	\$5,000	\$5,000
19	WATER MAIN RELOCATE	5 EA	\$1,800	\$9,000
	Sub-Total			\$600,800
	Construction Contingency (20%)			\$120,160
	Total Construction Costs (rounded up to nearest \$10,000)			\$730,000
	Total Non-Construction Costs (engineering, inspection, etc.)			\$146,000
	TOTAL PROJECT COSTS (rounded up to nearest \$10,000)			\$880,000