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REPORT

Phase 2 SEAD
Correctional Facility Wastewater Plan

Seneca County Industrial Development Agency
Seneca County, New York

February 1999

O'BRIEN & GERE
ENGINEERS, INC.

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Seneca County, New York

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IT IS A VIOLATION OF LAW FOR ANY PERSON, ... OF THE DIRECTION OF ... PROFESSIONAL ENGINEER, TO ALTER ... DOCUMENT.

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February 1999

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List of abbreviations

alt.	alternative
avg.	average
BOD_5	Biochemical oxygen demand (five day)
cap.	capacity
$CBOD_5$	Carbonaceous biochemical oxygen demand (five day)
CG	Coast Guard
Corr. Fac.	Correctional Facility
dia.	diameter
disconn.	disconnect
DMR	Discharge Monitoring Report
DOCS	NYS Department of Corrections
elec.	electric
est.	estimated
ex.	existing
Exp.	expansion
gal.	gallons
gpd	gallons per day
gpm	gallons per minute
IDA	Industrial Development Agency
I/I	infiltration and inflow
incl.	including
kVA	kilovolt-amperes
lbs/da.	pounds per day
lf	linear feet
LS	lump sum
maint.	maintenance
max.	maximum
mgd	million gallons per day
mg/l	milligrams per liter
misc.	miscellaneous
ml/l	milliliters per liter
mods	modifications
N/E	North End
No.	number

List of abbreviations, continued

NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NYSEG	New York State Electric and Gas Corporation
NYSOGS	New York State Office of General Services
O&M	operation and maintenance
PS	pumping station
PSC	NYS Public Service Commission
RBC	rotating biological contactor
React.	reactivation
RII	rainfall-induced infiltration
Rte.	Route
SCSD-1	Seneca County Sewer District No. 1
S/E	South End
SEAD	Seneca Army Depot
SPDES	State Pollutant Discharge Elimination System
tele.	telecommunications
TSS	total suspended solids
USEPA	United States Environmental Protection Agency
ww	wastewater
WWTP	wastewater treatment plant

Executive summary

This report was requested by the Seneca County Industrial Development Agency (IDA) to investigate the existing conditions and potential future use of the Seneca Army Depot's (SEAD) wastewater facilities to service a proposed State maximum security Correctional Facility. The wastewater facilities are in the process of being abandoned by the Army as part of its on-going base closure. It is estimated the Army will be totally removed from the site by the year 2001. As the Army continues its base closure, these facilities will need to be taken over and operated by others.

The purpose of this study was to investigate wastewater treatment alternatives to provide service to the Correctional Facility and other customers. This report provides information relative to the SEAD's infrastructure, flow projections, an evaluation of the facilities, cost estimates of improvements and operation and maintenance, and recommendations relative to wastewater utility transition. It should be noted that continued service to the hamlet of Romulus is a paramount requirement.

The Army currently has two wastewater treatment plants (WWTP's) and their associated collection systems located on the Depot property. The North End WWTP (Plant No. 715) is currently out of service but has a stated capacity of 300,000 gpd and the South End WWTP (Plant No. 4) has a stated capacity of 252,000 gpd. A third facility considered is the 700,000 gpd Seneca County Sewer District No. 1' s (SCSD-1) WWTP at Willard. There is significant infiltration and inflow (I/I), including rainfall-induced infiltration, entering the sewer systems tributary to the SEAD WWTPs. The hamlet of Romulus discharges its wastewater to WWTP #4.

To provide wastewater service, six alternative plans were considered. The alternatives were developed based on a number of criteria including:

- geographic location of wastewater sources
- current capacity of conveyance and WWTPs
- current age, reliability and long-term usefulness of WWTPs
- potential for future WWTP expansion
- conceptual capital and operating costs
- current SPDES discharge permits
- regulatory requirements
- infiltration/inflow considerations

Two alternatives utilize a combination of both SEAD WWTP's to provide necessary service; one alternative utilizes the SCSD-1 WWTP at Willard; the North End WWTP provides treatment in one alternative; and two alternatives are considered using the South End WWTP. In addition to required treatment, necessary collection facilities under each alternative were identified.

The recommended plan of action to provide service to the Correctional Facility, while also providing service to the hamlet of Romulus, KidsPeace, and other areas, provides for the expansion of WWTP #4, construction of a new North End pumping station, required force main, and miscellaneous appurtenances. The selected plan, based on least annual cost, is Alternative 6 which has an estimated project cost of $2,981,000 and an estimated annual cost $352,400.

It appears that County sewer district formation is needed to provide for ownership of the existing systems and improvements. Maintaining wastewater service to the hamlet of Romulus is an important consideration in this plan. The development of the North End by KidsPeace will also require wastewater service, as will the Correctional Facility and some other near-term development.

Plans to create the necessary districts and negotiate with the power and telecommunication utilities should be initiated at the earliest possible time. At this writing, there are outstanding issues the Army will be addressing which may have an impact on final recommendations. These include its "condition assessment" of start-up of the North End wastewater treatment plant and North End sewer system smoke testing.

Resolution of the wastewater service issue will require addressing the electric power and telecommunication issue as well. Both of these on-site utilities are currently owned, operated, and maintained by the Army, and service will be needed to operate SEAD wastewater facilities. The electric system is a 4,800 volt delta, three wire system and is generally in accordance with New York State Electric and Gas Corp. (NYSEG) standards. Most of the electric system is overhead open wire construction. The telecommunication facilities include both telephone and local area network and are of both overhead and underground construction.

Operation of these facilities can be maintained after Army departure, assuming the necessary details and arrangements are made. We have made recommendations for improvements to the wastewater system. The transfer of electric and telephone operations to utility companies should provide for

continuity of service.

As development plans change in the future as other tenants become known, it will likely be necessary to re-evaluate the conclusions of this report. Therefore, the recommendations of this report should be considered flexible and interim.

1. Background and scope of services

1.1. Background

The Seneca County Industrial Development Agency (IDA) has assumed the position as an intermediary in the transfer of Seneca Army Depot (SEAD) facilities and land, except for land required for the proposed New York State Correctional Facility.

This Phase 2 report is focused on wastewater facility issues including providing wastewater service to the Correctional Facility, to KidsPeace (a youth detention facility to be developed at the SEAD North End), to the neighboring hamlet of Romulus (which encompasses parts of both the Town of Romulus and Town of Varick), and to maintaining wastewater service to Elliot Acres housing area at the SEAD South End. The U.S. Coast Guard Loran C station will remain on-site and treatment of their low flow will also be needed. Note that the hamlet of Romulus presently receives treatment of its wastewater at the South End Depot WWTP #4. Service to the hamlet will need to continue after the Army's departure.

The following describes the general scope of investigation under the "Phase 2 SEAD Correctional Facility Wastewater Plan".

1. Wastewater collection system: A review of the existing and proposed sanitary sewer collection system components required for a proposed Correctional Facility to be located due west of the U.S. Coast Guard Loran C site was conducted. Options to transport wastewater to the two existing SEAD wastewater treatment plants (WWTP) as well as to the Seneca County Wastewater Treatment Plant at Willard are defined for each alternative.

2. Wastewater treatment: A review of the three WWTP's noted above was made to evaluate the feasibility of providing service to the Correctional Facility, the hamlet of Romulus, and other SEAD users.

3. Electrical power and telecommunications systems: Power and telecommunications requirements needed to maintain service to

WWTP #4 (in excess of those requirements provided under the Phase 1 report) and sewage pumping stations was reviewed.

4. Access and ownership issues: Existing conditions and future ownership were reviewed relative to the current plans.

1.2. Scope of services

The scope of services for this report generally consists of the following activities:

1. A cursory review of the existing SEAD facilities, as described above. The review was based on a visual survey, available drawings, and record documents.

2. Assessment of existing facilities and compilation of wastewater demand projections for the identified land uses within the SEAD and for the hamlet of Romulus.

3. Identify feasible ownership options including utility operators and pros and cons of each alternative. Review implementation of ownership options, including interim measures, system transfers, leases, and district formation with the IDA's counsel.

4. Identify preliminary property issues, access requirements, and facility easement rights.

5. Prepare improvement and operating cost estimates as well as future expansion cost estimates as needed. Where appropriate, abandonment and demolition costs were identified.

6. Provide recommendations for future use of the subject SEAD utilities.

1.3. Authorization of the Engineers

O'Brien & Gere Engineers, Inc. was authorized to prepare this report for the Seneca County Industrial Development Agency under a Master Professional Services Agreement executed on April 15, 1998 and by Letter of Authorization executed on November 5, 1998.

2. Description of existing facilities

The Seneca Army Depot's existing wastewater facilities which are the subject of this Phase 2 study are described in the following two subsections. Collection facilities serving the Lake Housing Area of the SEAD were not included under Phase 2, nor was infiltration/inflow (I/I) investigation of the South End sewer system.

A summary of the data reviewed in conjunction with this project which was received from the Army and the Seneca County Industrial Development Agency included: engineering drawings of facility components; WWTP monthly Discharge Monitoring Reports (DMR's); general plans of the sanitary sewer system; internal sewer television inspection and grouting records; WWTP permit (NYSDEC); the 1996 "Reuse Plan and Implementation Strategy" report by RKG Associates, Inc.; the November 1997 "Utilities Conversion Plan" by Bergmann Associates; and the "Seneca Army Depot Conceptual Wastewater Master Plan" dated March 1998.

2.1. Wastewater collection facilities

Conveyance of wastewater on the SEAD property depends on gravity sanitary sewers and sewage pumping stations which flow to the two SEAD WWTP's. The sewers in the South End discharge into WWTP #4 and utilize four pumping stations within the service area, excluding the pumps within WWTP #4. North End sewers flow to WWTP #715. The lone pumping station in the North End serves only building #819, which is not included in KidsPeace's plans. The Army refers to pumping stations as lift stations. The existing wastewater facilities are shown on Figures 1 through 6.

According to SEAD general sanitary sewer mapping, there are approximately 35,600 linear feet of sanitary sewers in the two areas of the site (excluding the Lake Housing Area). The following table summarizes the size and estimated extent of the sanitary sewer system tributary to each of the WWTP's, based on the 400-scale mapping. The site also includes 2-inch, 4-inch, and 6-inch diameter force mains which are not included in the quantities below. The off-site public sanitary sewers and force mains in the hamlet of Romulus are not included either.

Table 2.1-1. *Summary of SEAD sanitary sewer collection system.*

Size	WWTP #4	WWTP #715
6-inch dia.	300	700
8-inch dia.	15,200	8,400
10-inch dia.	6,800	1,900
12-inch dia.	2,300	--
Totals	24,600	11,000

Note: length shown in linear feet, excluding service connection laterals.

The Army has reported that some of the main line sewers in the WWTP #4 and WWTP #715 service areas have been rehabilitated by slip-lining and internal pressure grouting methods.

There are seven pumping stations (PS) on the SEAD which are part of the sewage collection systems, excluding a lift station which is part of WWTP #4. Five of the seven stations have been operated by Yaws Environmental Process Control, Inc. (Yaws) under contract to the Seneca County Sewer District No.1 since August 1997, together with the operation of WWTP #4. The two stations not maintained by Yaws are the Coast Guard Pumping Station and Pumping Station #826 (at the North End). The approximate location of the five pumping stations in the South End and North End are shown on Figures 1 through 6.

In the Depot's South End, there are four pumping stations within the collection system, excluding WWTP #4 pumps. The Elliot Acres housing area (Pumping Station #247) and the U.S. Coast Guard area are each pumped separately to the Warehouse area which is served by pumping Station #314. Pumping station #363, also in the Warehouse area, discharges into the force main for Pumping Station #314. Review of these four South End pumping stations was not included in the Phase 2 scope of work.

In the North End of the Depot, one building in the south-central portion (in the "Q" Area) is served by Pumping Station #826, which was not inspected. The remainder of the buildings are serviced by gravity to WWTP #715.

The following table summarizes pumping station data, as reported by SEAD documents:

Table 2.1-2. *Pumping station data.*

Pumping station location	Location	No. of pumps	Pump capacity, gpm, ea.
WWTP #4 (lift station) *	S/E	2	300
Elliot Acres PS #247	S/E	2	125
#314	S/E	2	160
#363	S/E	2	125
U.S. Coast Guard	S/E	**	**
#826	N/E	2	125

Note: this table excludes Lakeside Housing area pumping stations.
** - the pumps are within the WWTP.*
*** - information on this pumping station was not available.*
Source: SEAD records

There are also off-site sanitary sewers that were considered for use under one of the alternatives. Sanitary sewer collection facilities which serve the Village of Ovid lie generally along New York State Route 96A south of the SEAD, beginning at the northwestern corner of the Village. The Ovid trunk sewer was constructed in 1978 and discharges into old sanitary sewers on the State's Willard Drug Treatment Center (DTC) site, which then discharges into the SCSD-1 WWTP at Willard . The Seneca County Sewer District No 1 maintains a sewage flow monitor at the end of the Ovid trunk sewer.

The Ovid trunk sewer is 10-inch diameter and about 9,300 linear feet (l.f.) in length. The DTC trunk sewer size ranges from 10-inch to 18-inch diameter and is about 8,500 l.f. in length. It is primarily 12-inch and 18-inch diameter with one section of 10-inch diameter trunk sewer in the lower portion. These facilities are shown on Figures 1 through 6.

Romulus and Varick are currently maintaining their own systems off the SEAD site.

2.2. Wastewater treatment facilities

Three existing wastewater treatment facilities have been considered for treating existing and future flows at the former SEAD and from the new planned Correctional Facility. These facilities include two existing WWTPs on SEAD property and the existing Seneca County Sewer District No. 1 WWTP at Willard. The following is a description of these existing facilities.

2.2.1. SEAD WWTP No. 4

This treatment facility services the South End of the SEAD, as well as the hamlet of Romulus. It is located in the northern side of the south end, due west of the hamlet of Romulus and about a 0.5 mile west of the eastern SEAD boundary (shown on Figures 1 through 6). This facility was originally constructed in 1942 and received an upgrade in 1987 with the replacement of the Imhoff Tank. A process flow diagram for this facility is shown on Figure 7. The final effluent polishing is done in a natural wetland to the north of the plant. The wetland becomes Kendig Creek which flows northerly to the Seneca River.

The rated capacity of WWTP #4 is 252,000 gallons per day (gpd). The SPDES effluent permit limitations for WWTP #4 are shown below:

Table 2.2-1. *WWTP No.4 effluent limitations (Outfall #001).*

Parameter	Criteria	Mass loading
Max flow rate (30 day mean)	0.25 mgd	
BOD_5 (30 day mean)	30 mg/l	62.5 lbs/da.*
BOD_5 (7 day mean)	45 mg/l	93.8 lbs/da.
Suspended solids (30 day mean)	30 mg/l	62.5 lbs/da.*
Suspended solids (7 day mean)	45 mg/l	93.8 lbs/da.
pH	6.0 to 9.0	
Settleable solids	0.3 ml/l	

** - Effluent shall not exceed 15% of influent.*
Source: DEC SPDES Permit

Table A (located at end of this report) provides the current basis of design. Table B (located at end of this report) provides a comparison of the Ten States Standards design criteria. Table B identifies that the total treatment capacity of the plant is approximately 161,250 gpd based on anticipated design wastewater characteristics. The limiting unit process within WWTP No. 4 is the hydraulic loading limitation of the secondary settling tank. The treatment facility current operates primarily to serve the hamlet of Romulus, with a current estimated flow of 75,000 gpd. This plant is reportedly highly susceptible to infiltration/inflow (I/I) with estimated sustained flows in excess of 200,000 gpd. Discussions with NYSDEC inspection personnel indicate substantial I/I related problems occurred from January to April of 1998, with flows in excess of 300,000 gpd.

Conversations with NYSDEC also indicated that problems exist with the Imhoff Tank, in that scum is difficult to collect, due to the collection pipes being located above the water line. They indicate that the trickling filter operation is satisfactory, as well as that of the sludge drying beds. Due to the high level of I/I and the reduced domestic loading, the resultant dilute wastewater periodically makes achieving the required 85% removal of BOD_5 and TSS difficult.

A general inspection of WWTP #4 conducted by O'Brien & Gere on September 3, 1998 indicated that the plant is generally in good condition with the observations detailed in Table C.

2.2.2. SEAD WWTP No. 715

This treatment facility serves the North End of the SEAD and is located at the northern extreme of the property, about 0.6 mile east of the western SEAD property, as shown on Figures 1 through 6. The facility was constructed in the early 1980's and is rated at a capacity of 300,000 gpd. Figure 8 shows the process flow diagram for this treatment facility. The SPDES permit effluent limitations for this facility are shown below.

Table 2.2-2. *WWTP No. 715 effluent limitations (Outfall #002).*

Parameter	Criteria	Mass loading
Max flow rate (30 day mean)	0.30 mgd	
$CBOD_5$ (daily)	5 mg/l	12.5 lbs/da.
Suspended solids (30 day mean)	10 mg/l	25 lbs/da.*
Suspended solids (7 day mean)	20 mg/l	50 lbs/da.
Ammonia (as NH_3)	2.0 mg/l	
Dissolved Oxygen (min.)	7.0 mg/l	
pH	6.0 to 9.0	
Settleable solids	<0.1 ml/l	

** - Effluent shall not exceed 15% of influent.*
Source: DEC SPDES Permit

The plant was taken off line in November 1993 and has been bypassing flow since that time. Table D shows the basis of design of SEAD WWTP No. 715. Table E provides a comparison of the Ten States Standards design criteria. This indicates a treatment facility flow capacity of 107,000 gpd based on anticipated design wastewater characteristics. The limiting unit process within WWTP No. 715 is the organic loading limitation of the

rotating biological contactors. Similar to Plant No. 4, this facility is susceptible to excessive I/I. Discussions with NYSDEC inspection personnel indicate that currently I/I measures in excess of 50,000 gpd during dry weather and increases to as high as 800,000 gpd in wet weather.

A general inspection of plant No. 715 was conducted by O'Brien & Gere on September 3, 1998. The purpose of the review was to indicate needs and approximate costs for reactivating the treatment facility. This inspection revealed that the plant is generally in good condition with the observations detailed in Table F.

2.2.3. SCSD No. 1 WWTP (Willard)

This treatment facility is an extended aeration plant with a permitted daily flow of 700,000 gpd. A process flow diagram for the SCSD-1 WWTP is shown on Figure 9. Table G shows the basis of design of this plant. Table H provides a comparison of the Ten States Standards design criteria. This indicates a treatment facility flow capacity of 700,000 gpd based on anticipated design wastewater characteristics. The limiting unit process within this plant is the hydraulic loading limitation of both the extended aeration zone and settling zone of the extended aeration basins. The plant was designed for BOD_5 loading of 975 lbs/da and a TSS loading of 1,100 lbs/da. Currently the plant is below average flow and loading design conditions. Review of recent discharge monitoring reports (DMRs) indicate that current average flow is approximately 600,000 gpd, as demonstrated by Figures 10 and 11. Recent DMRs also indicate an average BOD_5 loading of 720 lbs/da and a TSS loading of 1,050 lbs/da. This plant operates well and is in generally good condition. There appears to be approximately 100,000 gpd potential capacity available based on current information. Note that this capacity may be used by future users such as the Town of Varick's proposed East Lake Road Sewer District.

2.3. Electrical and telecommunications services

The North End is supplied from a SEAD owned 4,800 volt overhead, 3 phase distribution feeder. The feeder runs near the eastern boundary of the site and is rated at about 5,000 kVA. The feeder originates in a NYSEG owned 34,500 : 4,800 volt substation located near the SEAD main entrance on Route 96. A switching substation located near the eastern boundary of the North End splits the feeder into several circuits for distribution to North End loads. In an emergency, a backup feeder that runs along the North-South Baseline Road can be used to supply the North End. This feeder has a capacity of about 1,200 kVA.

Most of the distribution system has been constructed to meet NYSEG standards and the requirements of the National Electrical Safety Code. Those portions of the system which would be used to supply KidsPeace loads, WWTP #715 (if selected), and a new North End sewage pumping station (if selected) are generally in satisfactory condition. Electric loads are generally not metered. Those meters that do exist do not appear to meet NYSEG and New York State Public Service Commission requirements for revenue metering.

Electric power to WWTP #4 is supplied by the same SEAD owned 4,800 volt feeder that supplies the North End.

Existing telecommunications facilities in the North End include both telephone and local area network systems. More than 50 percent of the system is underground. The remainder is located on overhead utility poles. The outside trunk lines which supply the North End belong to Bell Atlantic and telephones in the North End have a 315 area code. Portions of the North End were formerly served by Trumansburg Home Telephone and Trumansburg still has some equipment in place.

WWTP #4 is presently in the 607 area code and receives telephone service via an overhead telephone line.

3. Flow estimates

3.1. Wastewater flows

Wastewater flow estimates were identified for each of the areas which will require service under this Phase, as previously described. Table 3.1-1. summarizes the flow estimate by area, and includes infiltration and inflow (I/I) for the South End sanitary sewers. This I/I quantity was previously calculated in a study conducted relative to SEAD WWTP's for the Seneca County Sewer District No. 1. The basis for flow estimates in this table includes projections furnished by the New York State Department of Correctional Services, W.L. Affiliates (for KidsPeace), flow records for WWTP #4 (for the hamlet of Romulus), and other projections documented in the Conceptual Wastewater Master Plan report previously cited.

Table 3.1-1. *Wastewater flow projections.*

Area	Type	Flow, gpd
1. Correctional Facility	Institutional	288,000
2. KidsPeace	Institutional	38,000
3. hamlet of Romulus	Domestic	75,000
4. Elliot Acres	Domestic	32,000
Total projected wastewater flow		433,000

The hamlet of Romulus and adjacent portion of the Town of Varick, including the elementary school, is estimated to generate an average daily wastewater flow of about 75,000 gpd. This is based on WWTP #4 flow for August through October 1997, and corresponds well with the reported water consumption of the area in the 1996 "Reuse Plan and Implementation Strategy" report by RKG Associates, Inc.

The U.S. Coast Guard facility is anticipated to remain on the site operating the Loran C antenna station. It is at the southeastern extremity of the South End and is projected to contribute approximately 60 gpd. Although this facility requires sanitary service, it is not practical to maintain the existing facilities for such low flow. Further, the sewage is anticipated to become septic due to the long residence time in the collection system (without

dilution), and it would likely create odor problems. We recommend that the Coast Guard wastewater be disposed of by using an on-site subsurface system to allow the existing pumping station to be abandoned.

KidsPeace is planning on occupying numerous North End buildings and will have a flow contribution of about 38,000 gpd after full development in its third year.

Wastewater flow projections for the Elliot Acres Housing area of the SEAD were based on the Amended Land Use Plan prepared in September 1997 "Draft Utilities Conversion Plan" by RKG Associates.

The Correctional Facility demand was based on input received from the New York State Office of General Services in a letter dated November 6, 1998. Its planning for wastewater loadings of maximum security facilities is based on 160 gallons per day (gpd) per inmate, which includes staff, cafeteria, and other demands. The current plan is for a facility with 750 cells and 1500 inmates, with a possible future expansion to 1800 inmates. Therefore, the figure in the table above was based on 1800 inmates at a daily rate of 160 gpd per inmate.

Estimated wastewater organic loadings used in the assessment of treatment requirements were based on the criteria presented in the following table. Figures were rounded as appropriate.

Table 3.1-2. *Wastewater organic loading projections.*

Area	BOD_5, mg/l	Mass Loading, lbs/da.
1. Correctional Facility	* 400	961
2. KidsPeace	220	70
3. hamlet of Romulus	220	138
4. Elliot Acres	220	59
Total projected wastewater loadings	** 340	1,227

** - Based on information provided by NYS OGS.*

*** - The total projected organic loading shown does not include the effect of I/I. The projected organic loading with S/E I/I flow included is approximately 226 mg/l.*

3.2. SEAD infiltration and inflow

Infiltration and inflow (I/I) to a sanitary sewer system are extraneous flows which enter through below-ground defects in the collection system (infiltration) or via stormwater connections such as roof drains and catch basins (inflow). I/I contributions to a sewer system require treatment of "clean water", reduce available system capacity, and can cause hydraulic overloading of treatment facilities. For these reasons, direct connection of storm or groundwater to the sanitary system are prohibited and I/I should be removed from sewer systems.

Building footing drain connections are typically classified as inflow sources reactive to storm events, however they can also serve as infiltration sources contributing flow for an extended duration following precipitation. This "combined" effect is commonly known as rainfall-induced infiltration (RII). RII can also enter a sewer system from broken and cracked service connections.

It was reported that the Army had undertaken I/I investigation and repairs both in the early 1980's and early 1990's. The work generally consisted of repairing a portion of mainline sanitary sewer and manholes in the South End. Some of the sewers were sliplined with polyethylene pipe to repair defects. In the 1992-93 timeframe, manhole repairs and pressure grouting of mainline sewer joints were also performed on various sewers. Sewer rehabilitation in the North End sewer system also consisted of slip lining and pressure grouting of pipe joints. It is noted that the rehabilitation work conducted appears to have targeted infiltration sources of the mainline sewer only, and inflow source were not identified.

In the Fall of 1998, under Phase 1 activities, the Army provided internal television inspection of North End sewers, except those in the "Q" Area. Defects relating to possible infiltration sources were identified and the costs to repair them are included herein. North End sewer smoke testing, designed to identify inflow sources, will reportedly be conducted in the Spring of 1999.

Identification of I/I sources in the South End sewer system would be the subject of a future phase of work.

A cursory review of WWTP #4 flow records and NYSDEC comments in its annual inspection report indicates that the wastewater flow increases substantially in response to precipitation (subsequent to rehabilitation). The increased flow response was observed to occur on the same day as a

significant storm, indicating inflow connections are present. The high post-storm sewage flow also prevails generally for a few days following the storm event, which is characteristic of RII type sources.

In the case of WWTP #715, a review of the flow data prior to plant shutdown, during certain rainfall events, indicates a strong correlation of the precipitation to increased flow, and especially indicates a delayed trend for the flow to return to "normal". This is indicative that an RII problem exists in the North End.

The I/I tributary to each SEAD WWTP is summarized in the following tabulation. The values chosen to be representative of the I/I problem are the differences between the "30-day average flow" and the "average of the monthly peak day flow" for each plant, as previously documented in the March 1998 "Conceptual Wastewater Master Plan". The impact of extraneous flows on the two SEAD plants is substantial as it represents a limiting factor on hydraulic capacity.

Table 3.2-1. *Infiltration and inflow estimates.*

Area	Gravity sewers tributary to	I/I, gpd
1. South End I/I	WWTP #4	217,000
2. North End I/I	WWTP #715	209,000

4. Alternative solutions

The identification of feasible alternatives for providing the intended service was based on the potential utilization of the three WWTPs previously mentioned in Section 2.2. The Correctional Facility would be the major sewage flow contributor. Four possibilities were identified to handle the Correctional Facility wastewater demand, as follows:

1. Treatment would be provided through a combination of both the South End plant and the North End plant. This maximizes current treatment capacity and minimizes improvements required;

2. Treatment would be provided at the SCSD No. 1 WWTP at Willard;

3. Treatment would be provided at the North End plant; and

4. Treatment would be provided at the South End plant.

From these four treatment concepts, six alternatives were identified comparing the costs associated with each. In two of the alternatives, the existing South End sanitary sewer system was considered to be isolated from the treatment processes, thereby eliminating previously identified infiltration/inflow from consideration. The impact this isolation may have on South End buildings and sewers was considered to be beyond the scope of this study. Note, however, that the alternatives which have accounted for South End I/I could provide service to other future South End users if I/I is eliminated or reduced from the sewer system.

We have assumed that the State will provide the following facilities as part of the Correctional Facility project:

1. Correctional Facility site gravity sanitary sewers;

2. A sewage equalization tank, as required to dampen peak flow surges, and coarse screening of wastewater;

3. Injection of an odor control additive to mitigate potential of sewage becoming septic (Bioxide or equivalent);

4. Complete wastewater pumping units to provide a continuous flow

rate to the treatment facility that does not exceed 200 gpm. This provides for treatment of 288,000 gpd; and

5. A flow meter on the force main.

The six alternative solutions are described in the following subsection.

4.1. Description of alternative solutions

Based on the wastewater flows identified in Section 3 and the current available collection and treatment facilities discussed in Section 2, a combination of feasible alternatives has been developed. In developing feasible combinations, the following criteria were utilized:

- geographic location of wastewater sources
- current capacity of conveyance and WWTPs
- current age, reliability and long-term usefulness of WWTPs
- potential for future WWTP expansion
- conceptual capital and operating costs
- current SPDES discharge permits
- regulatory requirements
- infiltration/inflow considerations

The six alternative solutions consider the required facilities for each of the identified areas which need wastewater service. These alternatives are shown on Figures 1 through 6.

Alternatives 1 and 2 provide for treatment of the Correctional Facility sewage at the South End WWTP and the North End WWTP by using a flow control valve to regulate excess flow from the South End plant and direct it to the North End plant. The primary difference between these alternatives is the treatment of South End I/I (Alternative 1 excludes South End I/I).

Alternative 3 provides for treatment of Correctional Facility sewage at the SCSD No. 1 WWTP at Willard and treatment of all other wastewater at the South End plant.

Alternative 4 provides for treating all sewage at the North End plant. Under this alternative, South End sewers are plugged and I/I is assumed to be isolated from treatment.

Alternatives 5 and 6 provide for treatment of all sewage at the South End plant. Alternative 5 accounts for South End I/I similar to Alternative 2,

whereas Alternative 6 excludes that I/I contribution (as with Alternatives 1 and 4).

The following table illustrates where each source would receive treatment under the six alternatives.

Table 4.1-1. *Summary of treatment service by alternative.*

Alt.	Corr. Fac.	KidsPeace	hamlet of Romulus	Elliot Acres
1 *	S/N	N	S	S
2	S/N	N	S	S
3	W	S	S	S
4 *	N	N	N	N
5	S	S	S	S
6 *	S	S	S	S

N - North End WWTP #715.
S - South End WWTP #4.
W - Seneca County Sewer District No. 1 WWTP at Willard.
S/N - combined South End and North End WWTP's.
** - South End sewers are assumed to be plugged off, thereby eliminating infiltration/inflow from treatment.*

4.2. Summary of wastewater flows by alternative

To adequately address the wastewater flow which will be treated at each WWTP under each alternative, the next six tables are presented.

Table 4.2-1. *Alternative 1 -- Summary of wastewater flows by WWTP.*

Alt.	Area	N/E WWTP #715	S/E WWTP #4	SCSD-1 WWTP at Willard
1	hamlet of Romulus	--	75,000	--
	Elliot Acres	--	32,000	--
	Corr. Fac.	143,000	145,000	--
	KidsPeace	38,000	--	--
	S/E I/I	--	--	--
	Totals	181,000	252,000	--

Note: flow rates in table reported in gpd.

Table 4.2-2. *Alternative 2 -- Summary of wastewater flows by WWTP.*

Alt.	Area	N/E WWTP #715	S/E WWTP #4	SCSD-1 WWTP at Willard
2	hamlet of Romulus	--	75,000	--
	Elliot Acres	--	32,000	--
	Corr. Fac.	262,000	26,000	--
	KidsPeace	38,000	--	--
	S/E I/I	--	217,000	--
	Totals	300,000	350,000	--

Note: flow rates in table reported in gpd.

Table 4.2-3. *Alternative 3 -- Summary of wastewater flows by WWTP.*

Alt.	Area	N/E WWTP #715	S/E WWTP #4	SCSD-1 WWTP at Willard
3	hamlet of Romulus	--	75,000	--
	Elliot Acres	--	32,000	--
	Corr. Fac.	--	--	288,000
	KidsPeace	--	38,000	--
	S/E I/I	--	217,000	--
	Totals	0	362,000	288,000

Notes: flow rates in table reported in gpd.
The Willard WWTP flow is the incremental increase.

Table 4.2-4. *Alternative 4 -- Summary of wastewater flows by WWTP.*

Alt.	Area	N/E WWTP #715	S/E WWTP #4	SCSD-1 WWTP at Willard
4	hamlet of Romulus	75,000	--	--
	Elliot Acres	32,000	--	--
	Corr. Fac.	288,000	--	--
	KidsPeace	38,000	--	--
	S/E I/I	0	--	--
	Totals	433,000	0	--

Note: flow rates in table reported in gpd.

Table 4.2-5. *Alternative 5 -- Summary of wastewater flows by WWTP.*

Alt.	Area	N/E WWTP #715	S/E WWTP #4	SCSD-1 WWTP at Willard
5	hamlet of Romulus	--	75,000	--
	Elliot Acres	--	32,000	--
	Corr. Fac.	--	288,000	--
	KidsPeace	--	38,000	--
	S/E I/I	--	217,000	--
	Totals	0	650,000	--

Note: flow rates in table reported in gpd.

Table 4.2-6. *Alternative 6 -- Summary of wastewater flows by WWTP.*

Alt.	Area	N/E WWTP #715	S/E WWTP #4	SCSD-1 WWTP at Willard
6	hamlet of Romulus	--	75,000	--
	Elliot Acres	--	32,000	--
	Corr. Fac.	--	288,000	--
	KidsPeace	--	38,000	--
	S/E I/I	--	0	--
	Totals	0	433,000	--

Note: flow rates in table reported in gpd.

Table 4.2-7. summarizes the organic loading criteria at each WWTP under each of the alternatives. The mg/l columns represent the BOD_5 organic concentrations based on the flows at the respective plants. The lb/da. columns represent the total influent mass loading to the respective plants each day. Numerical values were rounded as appropriate.

Table 4.2-7. *Summary of organic loadings at WWTP's by alternative.*

Alt.	N/E WWTP #715		S/E WWTP #4		SCSD-1 WWTP at Willard	
	mg/l	lb/da.	mg/l	lb/da.	mg/l	lb/da.
1	362	547	323	680	--	--
2	377	944	97	283	--	--
3	--	--	81	266	400	961
4	340	1227	--	--	--	--
5	--	--	226	1227	--	--
6	--	--	340	1227	--	--

4.3. Collection system alternatives

It has been assumed for all alternatives that flow equalization and pumping for the Correctional Facility will be provided by DOCS under facility construction. The following paragraphs summarize the various collection facility requirements by alternative:

Alternative 1: a new 6-inch diameter force main from the Correctional Facility site to a flow control valve (FCV); a 4-inch diameter force main from the FCV to the end of the North End collection system; a 4-inch diameter force main from the FCV to the South End WWTP #4; a force main from Elliot Acres to the Romulus sewers; plugging sewers to be abandoned; sewer rehabilitation of North End sewers; and miscellaneous appurtenances. Under this alternative, pumping stations #363 and #314 are not needed. Refer to Figure 1 for an illustration of this alternative.

Alternative 2: a new 6-inch diameter force main from the Correctional Facility site to a flow control valve (FCV); a 4-inch diameter force main from the FCV to the end of the North End collection system; a 4-inch force main from the FCV to the South End WWTP #4; sewer rehabilitation of North End sewers; and miscellaneous appurtenances. Under this alternative, pumping station #363 is not needed. Refer to Figure 2 for an illustration of this alternative.

Alternative 3: a new 6-inch diameter force main from the Correctional Facility site southerly along local roads, along the right-of-way of the existing Ovid trunk sewer, and southerly and westerly around the Drug Treatment Center to the Willard WWTP; a new pumping station and force

that the route shown is east and south of the Drug Treatment Center to avoid conflicts and security issues. An allowance is included in the cost estimate to prepare and secure necessary rights-of-way.

4.4. Wastewater treatment alternatives

The wastewater treatment considerations for the six alternatives are based upon the evaluation of the three existing WWTPs discussed in Section 2. As part of this evaluation, O'Brien & Gere visited the SEAD treatment facilities and prepared an assessment of upgrade needs to reactivate WWTP #715 and to modify WWTP #4 to be suitable for long term use. As part of this evaluation, O'Brien & Gere also compared available information on WWTP basis of design to current NYSDEC/Ten States Standards, assuming that facilities to be utilized for long term service should meet current standards. This comparison indicated that based on Ten States Standards, WWTP #715 capacity is actually 107,000 gpd vs. the rated 300,000 gpd and that WWTP #4 is 161,250 gpd vs. the rated 252,000 gpd. This deviation from design capacity is due to a combination of factors, but is primarily related to unit process limitations, as well as permitted effluent requirements to the receiving waters.

Based upon this comparison, the treatment alternatives developed not only included the modifications necessary to reactivate/upgrade WWTPs, but also included modifications to meet the rated capacities, and where appropriate, expansion to meet the future flows associated with the specific alternative.

Modifications which are needed to upgrade WWTP #4 and to reactivate WWTP #715 for long term use have been identified. These modifications are detailed in Section 5.2 of this report in Tables 5.2-1. and 5.2-2. respectively. Additionally, various modifications are proposed at the three WWTPs which address the potential expansion requirements to meet future flows. Tables 5.2-3. through 5.2-5. present the specific expansion improvements.

Review of the SPDES requirements for WWTP #715 indicates that effluent ammonia limits, as well as more stringent limitations for BOD_5 and TSS, exist due to the nature of the receiving water (Reeder Creek). Due of these restrictive effluent limitations, consideration was given to two different points of discharge. In addition to considering the existing point of discharge, the impact of discharging the effluent directly to Seneca Lake was reviewed. In order for this option to be feasible, effluent limitations established for discharging to the Lake would need to be less stringent than those for Reeder Creek. Otherwise, construction of an effluent pipeline from

the WWTP to the Lake would not be warranted.

Under two of the three options in which WWTP #715 would be utilized (Alternatives 2 and 4), it was found to be more cost effective to discharge to the Lake than to the Creek (based on the assumption the Lake's effluent limitations for this plant would be similar to those for SCSD-1 WWTP at Willard). In the other alternative using WWTP #715 (Alternative 1), it was found that discharging to the Creek would be more cost effective than discharging to the Lake because the more stringent effluent limitations of Reeder Creek could be met with minimal improvements at the lower flow rate of this alternative. Actual discharge limits need to be confirmed with NYSDEC prior to moving to the next phase of this program.

The following is a breakdown of these modifications by alternative.

Alternative 1

- upgrade WWTP #4
- replace existing secondary clarifier at WWTP #4 to meet rated capacity (252,000 gpd)
- reactivate WWTP #715
- add RBC capacity to WWTP #715 to meet rated capacity

Alternative 2

- upgrade WWTP #4
- replace secondary clarifier at WWTP #4 to meet expanded capacity
- expand WWTP #4 from 252,000 gpd to 350,000 gpd by upgrading headworks and adding parallel Imhoff, trickling filter, drying bed area and miscellaneous modifications
- reactivate WWTP #715
- add RBC capacity to WWTP #715 to meet rated capacity
- add effluent main from WWTP #715 to Seneca Lake

Alternative 3

- upgrade WWTP #4
- replace secondary clarifier at WWTP #4 to meet expanded capacity
- expand WWTP #4 from 252,000 gpd to 362,000 gpd by upgrading headworks and adding parallel Imhoff, trickling filter, drying bed area, and miscellaneous modifications
- expand SCSD-1 WWTP at Willard from 700,000 gpd to 900,000 gpd by adding a parallel extended aeration tank, rapid sand filter,

chlorination tank, additional sludge drying bed area, and miscellaneous modifications

This alternative includes treatment of South End I/I. To determine whether excluding this I/I from the alternative would have an impact on the recommended solution, a review was made. Since elimination of I/I would not offer a cost-effective solution, it was not presented as an option. The estimated cost savings by eliminating I/I is shown in Section 5.4.

Alternative 4

- reactivate WWTP #715
- add RBC capacity to WWTP #715 to meet rated capacity
- add effluent main from WWTP #715 to Seneca Lake
- expand WWTP #715 from 107,000 gpd to 433,000 gpd capacity by adding parallel units for headworks, primary settling tank, RBCs, secondary settling tank, sand filter, chlorination, additional sludge drying bed area, and miscellaneous modifications

Alternative 5

- upgrade WWTP #4
- replace secondary clarifier at WWTP #4 to meet expanded capacity
- expand WWTP #4 from 252,000 gpd to 650,000 gpd by upgrading headworks and adding parallel Imhoff, trickling filter, drying bed area and miscellaneous modifications

Alternative 6

- upgrade WWTP #4
- replace secondary clarifier at WWTP #4 to meet expanded capacity
- expand WWTP #4 from 252,000 gpd to 433,000 gpd by upgrading headworks and adding parallel Imhoff, trickling filter, drying bed area and miscellaneous modifications

Costs associated with the above alternatives are presented in Section 5.

4.5. Electrical power and telecommunications evaluation

The operation of either or both SEAD WWTP's will require electrical power and telecommunication service. Presently, the Army owns the infrastructure and provides these services. In the Phase 1 SEAD Utility Transition Plan,

transition of these utilities was addressed. The conditions stated therein, as well as relevant improvements, are valid for this Phase. Aside from the actual transition of facilities from the Army to utility companies, the chief need is the installation of revenue meters at each of the plants.

In addition to service to the WWTP's, power and telecommunication service would be needed for sewage pumping stations that may be required under the alternatives. These are the Elliot Acres pumping station and a new North End pumping station (under Alternatives 3, 5, and 6).

Power for the Correctional Facility pumping station is assumed to be provided independent of Depot power, as it is reported that the Correctional Facility will install a new service from NYSEG's facilities along Route 96, bypassing the existing SEAD electrical substation.

5. Cost estimates

This section presents costs associated with construction of wastewater collection alternatives, the construction of wastewater treatment improvement alternatives, and the operation and maintenance of the respective collection and treatment facilities. It was assumed that no cost would be incurred for the transfer of the Army's existing facilities or for land acquisition. However, a cost allocation was included with Alternative 3 for the acquisition of off-site rights-of-way for the force main route to the SCSD-1 WWTP at Willard.

The following subsections list the work tasks and estimated costs for each alternative. For purposes of this report, we have assumed the improvements would be publicly bid and have conservatively included full engineering related services (design and construction inspection, surveys and soil borings), plus legal and miscellaneous costs such as advertising and interest during construction.

5.1. Collection system cost estimates

The required facilities under each alternative are listed in Section 4 and illustrated in Figures 1 through 6. The following tables summarize the improvements and costs for each of the collection facility alternatives.

Table 5.1-1. *Summary of Alternative 1 collection system improvements.*

Category	Component	Cost Estimate
1. Mobilization		$28,000
2. Clearing		25,000
3. Force main	4-inch dia., 4,500 l.f.	99,000
	6-inch dia., 29,000 l.f.	725,000
	3-way flow control valve	10,000
4. Sewer rehabilitation	Chemical grout (28 @ $1,000 ea.)	28,000
	Excavate/repair (3 @ $4,000 ea)	12,000
	Repair water break (2 @ $1,500 ea)	3,000
	Sewer slip-lining (200 lf @ $50)	10,000
5. Inflow source removal	(unidentified)	*
6. Pump replacement	Elliot Acres	25,000
	hamlet of Romulus	35,000
7. Misc. appurtenances		10,000
Estimated Bid Price		$1,010,000
Contingencies		152,000
Estimated Construction Cost		$1,162,000
Estimated Engineering, Legal & Miscellaneous		291,000
Estimated Project Cost		$1,453,000

** - cost for inflow rehabilitation to be identified after future investigations not authorized as part of this study (includes rainfall-induced infiltration sources).*

Table 5.1-2. *Summary of Alternative 2 collection system improvements.*

Category	Component	Cost Estimate
1. Mobilization		$23,000
2. Clearing		25,000
3. Force main	4-inch dia., 1,000 l.f.	22,000
	6-inch dia., 29,000 l.f.	725,000
	3-way flow control valve	10,000
4. Sewer rehabilitation	Chemical grout (28 @ $1,000 ea.)	28,000
	Excavate/repair (3 @ $4,000 ea)	12,000
	Repair water break (2 @ $1,500 ea)	3,000
	Sewer slip-lining (200 lf @ $50)	10,000
5. Inflow source removal	(unidentified)	*
6. Misc. appurtenances		10,000
Estimated Bid Price		$868,000
Contingencies		130,000
Estimated Construction Cost		$998,000
Estimated Engineering, Legal & Miscellaneous		250,000
Estimated Project Cost		$1,248,000

** -cost for inflow rehabilitation to be identified after future investigations not authorized as part of this study (includes rainfall-induced infiltration sources).*

Note - The cost of the effluent main is in Table 5.2-4.

Table 5.1-3. *Summary of Alternative 3 collection system improvements.*

Category	Component	Cost Estimate
1. Mobilization		$34,000
2. Clearing		50,000
3. Force main	6-inch dia., 35,000 l.f.	875,000
	6-inch dia., 10,000 l.f. (off-site, along public roads)	400,000
	Cased crossing (Rte 96A)	12,000
	Stream crossing (Simpson Creek)	6,000
4. Sewer rehabilitation	Chemical grout (28 @ $1,000 ea.)	28,000
	Excavate/repair (3 @ $4,000 ea)	12,000
	Repair water break (2 @ $1,500 ea)	3,000
	Sewer slip-lining (200 lf @ $50)	10,000
5. Inflow source removal	(unidentified)	*
6. Sewage pumping station	at North End	87,000
7. Misc. appurtenances		10,000
Estimated Bid Price		$1,527,000
Contingencies		229,000
Estimated Construction Cost		$1,756,000
Allowance for land acquisition (east & south of Drug Treatment Center)		10,000
Estimated Engineering, Legal & Miscellaneous		439,000
Estimated Project Cost		$2,205,000

** -cost for inflow rehabilitation to be identified after future investigations not authorized as part of this study (includes rainfall-induced infiltration sources).*

Table 5.1-4. *Summary of Alternative 4 collection system improvements.*

Category	Component	Cost Estimate
1. Mobilization		$28,000
2. Clearing		25,000
3. Force main	4-inch dia., 3,500 l.f.	77,000
	6-inch dia., 30,000 l.f.	750,000
4. Sewer rehabilitation	Chemical grout (28 @ $1,000 ea.)	28,000
	Excavate/repair (3 @ $4,000 ea)	12,000
	Repair water break (2 @ $1,500 ea)	3,000
	Sewer slip-lining (200 lf @ $50)	10,000
5. Inflow source removal	(unidentified)	*
6. Pump replacement	Elliot Acres	25,000
	hamlet of Romulus	35,000
7. Misc. appurtenances		10,000
Estimated Bid Price		$1,003,000
Contingencies		150,000
Estimated Construction Cost		$1,153,000
Estimated Engineering, Legal & Miscellaneous		288,000
Estimated Project Cost		$1,441,000

** -cost for inflow rehabilitation to be identified after future investigations not authorized as part of this study (includes rainfall-induced infiltration sources).*
Note - The cost of the effluent main is in Table 5.2-4.

Table 5.1-5. *Summary of Alternative 5 collection system improvements.*

Category	Component	Cost Estimate
1. Mobilization		$25,000
2. Clearing		25,000
3. Force main	6-inch dia., 28,000 l.f.	700,000
	Connection to ex. F.M.	3,000
4. Sewer rehabilitation	Chemical grout (28 @ $1,000 ea.)	28,000
	Excavate/repair (3 @ $4,000 ea)	12,000
	Repair water break (2 @ $1,500 ea)	3,000
	Sewer slip-lining (200 lf @ $50)	10,000
5. Inflow source removal	(unidentified)	*
6. Sewage pumping station	at North End	87,000
7. Misc. appurtenances		10,000
Estimated Bid Price		$903,000
Contingencies		135,000
Estimated Construction Cost		$1,038,000
Estimated Engineering, Legal & Miscellaneous		260,000
Estimated Project Cost		$1,298,000

** -cost for inflow rehabilitation to be identified after future investigations not authorized as part of this study (includes rainfall-induced infiltration sources).*
ex. F.M. - existing force main.

Table 5.1-6. *Summary of Alternative 6 collection system improvements.*

Category	Component	Cost Estimate
1. Mobilization		$28,000
2. Clearing		25,000
3. Force main	4-inch dia., 3,500 l.f.	77,000
	6-inch dia., 34,000 l.f.	850,000
4. Sewer rehabilitation	Chemical grout (28 @ $1,000 ea.)	28,000
	Excavate/repair (3 @ $4,000 ea)	12,000
	Repair water break (2 @ $1,500 ea)	3,000
	Sewer slip-lining (200 lf @ $50)	10,000
5. Inflow source removal	(unidentified)	*
6. Pump replacement	Elliot Acres	25,000
	hamlet of Romulus	35,000
7. Sewage pumping station	at North End	87,000
8. Misc. appurtenances		10,000
Estimated Bid Price		$1,190,000
Contingencies		179,000
Estimated Construction Cost		$1,369,000
Estimated Engineering, Legal & Miscellaneous		342,000
Estimated Project Cost		$1,711,000

** -cost for inflow rehabilitation to be identified after future investigations not authorized as part of this study (includes rainfall-induced infiltration sources).*

5.2. Wastewater treatment cost estimates

The estimated cost of treatment improvements for the three WWTP's were developed from a variety of sources, including vendor quotations, historical O'Brien & Gere WWTP construction costs, past experience, and a USEPA Technical Report on construction costs for municipal wastewater treatment plants. Costs used reflect adjustments for location and timing of the work.

Operation and maintenance costs were similarly developed, with the use of

O'Brien & Gere's previous experience with operation and maintenance of facilities in this range of capacity and a USEPA Technical Report on estimating staffing for municipal wastewater treatment facilities. Costs used reflect adjustments for location.

The estimated cost of treatment improvements for the three WWTP's are shown in the following eleven tables. The first five tables form the basis for the various types of improvements at the three WWTPs: upgrade improvements, reactivation improvements, and expansion improvements. The final six tables in this subsection present a summary of the WWTP capital costs required under each alternative.

Table 5.2-1. *Cost estimate for upgrade of SEAD S/E WWTP No. 4.*

Category	Component	Cost Estimate
Influent channels and grit removal structure	General clean out and miscellaneous concrete modification (to eliminate solids accumulation)	$5,000
Control Building	Isolation of pump area from control room	10,000
	Upgrade HVAC and electrical systems to meet Class 1 Group D electrical standards in pump area	20,000
	Influent pump control floats replacement	2,000
	Laboratory upgrade	4,000
Imhoff tank	Scum removal modifications	5,000
	Safety improvements	2,000
Trickling filter	General filter clean out	2,000
	Exhaust improvements	3,000
Distribution manhole	Reconstruction	1,000
Secondary settling tank	Sludge/solids removal from tank and effluent channel	2,000
Sludge drying beds	Bed clean out and reconditioning with addition of new media	2,000

Table 5.2-1. *Cost estimate for upgrade of SEAD S/E WWTP No. 4 (continued).*

Category	Component	Cost Estimate
Site improvements	Build new equipment garage/ maintenance shop	30,000
	Site fence	20,000
	Site work	2,000
Power improvements	WWTP # 4 meter	7,000
Estimated Bid Price		$117,000
Contingencies		18,000
Estimated Construction Cost		$135,000
Estimated Engineering, Legal & Miscellaneous		35,000
Estimated Project Cost		$170,000

Table 5.2-2. *Cost estimate for reactivation of SEAD N/E WWTP No. 715.*

Category	Component	Cost Estimate
Channels and tankage	General clean out and miscellaneous concrete restoration	$10,000
Process equipment	General start-up, rehabilitation, and repairs (including manufacturer's field equipment inspection and servicing for primary and secondary settling and sand filter tank mechanical equipment)	50,000
Influent channel in line bar screen	In line bar screen installation upstream of comminutor	2,000
Grit chamber	Grit screw and grit screw drive belt replacement and start-up	2,000
Sand filter	Traveling bridge motor replacement allowance	2,000
	Filter media replacement	1,000

Table 5.2-2. *Cost estimate for reactivation of SEAD N/E WWTP No. 715 (continued).*

Category	Component	Cost Estimate
Traveling bridges	Winter operation problem resolution (primary and secondary settling and sand filter tanks)	25,000
Main Treatment Structure	HVAC system rehabilitation and component replacement/additions	15,000
	Laboratory refurbishing	5,000
Chlorination and dechlorination tanks	Total system equipment replacement and start-up	5,000
Sludge pumping station	Submersible pump rehabilitation with replacement of control floats and control panel relays	3,000
Sludge drying beds	Bed rehabilitation with addition of new media	3,000
Site improvements	Site fence repairs and site work	3,000
Power and telecommunications improvements	WWTP #715 meter and tele.	8,000
Estimated Bid Price		$134,000
Contingencies		21,000
Estimated Construction Cost		$155,000
Estimated Engineering, Legal & Miscellaneous		40,000
Estimated Project Cost		$195,000

Table 5.2-3. *Cost estimate for expansions of SEAD S/E WWTP No. 4.*

Component	Exp. to 0.252 mgd	Exp. to 0.362 mgd	Exp. to 0.433 mgd	Exp. to 0.65 mgd
Preliminary treatment *	--	$48,000	$59,000	$95,000
Influent pumping	--	41,000	69,000	156,000
Imhoff tank	--	33,000	57,000	141,000
Trickling filter	--	191,000	218,000	300,000
Second. Settling tank **	$73,000	106,000	127,000	193,000
Sludge drying beds	--	29,000	38,000	55,000
Mobilization	2,000	10,000	18,000	45,000
Site work inc. excavation	5,000	35,000	63,000	160,000
Electrical and HVAC	2,000	46,000	76,000	175,000
Yard piping & plumbing	3,000	28,000	47,000	106,000
Estimated Bid Price	$85,000	$567,000	$772,000	$1,426,000
Contingencies	13,000	85,000	116,000	214,000
Est. Construction Cost	$98,000	$652,000	$888,000	$1,640,000
Est. Eng., Legal & Misc.	25,000	163,000	222,000	410,000
Estimated Project Cost	$123,000	$815,000	$1,100,000	$2,050,000

** - Cost estimate based on replacement of existing influent preliminary treatment structures including flow monitoring, bar screens, comminutor, and aerated grit chamber.*

*** - Cost estimate is based on abandonment of existing secondary settling tank and construction of a new secondary settling tank with parallel unit trains.*

Table 5.2-4. *Cost estimate for expansions of SEAD N/E WWTP No. 715.*

Component	Exp. to 0.181 mgd	Exp. to 0.3 mgd	Exp. to 0.433 mgd
Preliminary treatment	--	--	$15,000
Primary settling tank	--	--	23,000
RBCs:			
- with discharge to Creek	$520,000	--	--
- with discharge to Lake	--	$260,000	390,000

Table 5.2-4. *Cost estimate for expansions of SEAD N/E WWTP No. 715 (continued).*

Component	Exp. to 0.181 mgd	Exp. to 0.3 mgd	Exp. to 0.433 mgd
Effluent Main to Seneca Lake (14,000 lf of 6" and appurtenances)	--	618,000	618,000
Secondary settling tank	--	--	38,000
Sand Filter	--	--	91,000
Chlorination and dechlorination tank	--	--	20,000
Sludge drying bed	--	--	41,000
Mobilization	--	--	13,000
Site work inc. excavation	--	--	43,000
Electrical and HVAC	--	--	7,000
Yard piping & plumbing	--	--	33,000
Estimated Bid Price	$520,000	$878,000	$1,332,000
Contingencies	78,000	132,000	200,000
Est. Construction Cost	$598,000	$1,010,000	$1,532,000
Est. Eng., Legal & Misc.	150,000	253,000	383,000
Est. Project Cost	$748,000	$1,263,000	$1,915,000

Table 5.2-5. *Cost estimate for expansion of SCSD-1 WWTP at Willard.*

Component	Exp. to 0.89 mgd
Extended aeration tank	$383,000
Primary pumping station	64,000
Rapid sand filter	125,000
Chlorination tank	30,000
Sludge drying bed	225,000
Mobilization	20,000

Table 5.2-5. *Cost estimate for expansion of SCSD-1 WWTP at Willard (continued).*

Component	Exp. to 0.89 mgd
Site work inc. excavation	57,000
Electrical and HVAC	55,000
Yard piping & plumbing	40,000
Estimated Bid Price	$999,000
Contingencies	150,000
Est. Construction Cost	$1,149,000
Est. Eng., Legal & Misc.	287,000
Est. Project Cost	$1,436,000

Using the cost component information presented in the preceding five tables, total treatment cost estimates were prepared for each of the six alternatives. These estimates are presented in the next six tables.

Table 5.2-6. *Summary of Alternative 1 wastewater treatment improvements.*

WWTP	Estimated Upgrade/React. Project Cost	Estimated Exp. Project Cost	Estimated Total Project Cost
#4	$170,000	$123,000	$293,000
#715	195,000	748,000	943,000
SCSD-1	--	--	--
Subtotal	$365,000	$871,000	$1,236,000
Estimated Project Cost			$1,236,000

Note: refer to Tables 5.2-1. through 5.2-5. for basis of project cost estimates used in this table.

Table 5.2-7. *Summary of Alternative 2 wastewater treatment improvements.*

WWTP	Estimated Upgrade/React. Project Cost	Estimated Exp. Project Cost	Estimated Total Project Cost
#4	$170,000	$815,000	$985,000
#715	195,000	1,263,000	1,458,000
SCSD-1	--	--	--
Subtotal	$365,000	$2,078,000	$2,443,000
Estimated Project Cost			$2,433,000

Note: refer to Tables 5.2-1. through 5.2-5. for basis of project cost estimates used in this table.

Table 5.2-8. *Summary of Alternative 3 wastewater treatment improvements.*

WWTP	Estimated Upgrade/React. Project Cost	Estimated Exp. Project Cost	Estimated Total Project Cost
#4	$170,000	$815,000	$985,000
#715	--	--	--
SCSD-1	--	1,436,000	1,436,000
Subtotal	$170,000	$2,251,000	$2,421,000
Estimated Project Cost			$2,421,000

Note: refer to Tables 5.2-1. through 5.2-5. for basis of project cost estimates used in this table.

Table 5.2-9. *Summary of Alternative 4 wastewater treatment improvements.*

WWTP	Estimated Upgrade/React. Project Cost	Estimated Exp. Project Cost	Estimated Total Project Cost
#4	--	--	--
#715	$195,000	$1,915,000	$2,110,000
SCSD-1	--	--	--
Subtotal	$195,000	$1,915,000	$2,110,000
Estimated Project Cost			$2,110,000

Note: refer to Tables 5.2-1. through 5.2-5. for basis of project cost estimates used in this table.

Table 5.2-10. *Summary of Alternative 5 wastewater treatment improvements.*

WWTP	Estimated Upgrade/React. Project Cost	Estimated Exp. Project Cost	Estimated Total Project Cost
#4	$170,000	$2,050,000	$2,220,000
#715	--	--	--
SCSD-1	--	--	--
Subtotal	$170,000	$2,050,000	$2,220,000
Estimated Project Cost			$2,220,000

Note: refer to Tables 5.2-1. through 5.2-5. for basis of project cost estimates used in this table.

Table 5.2-11. *Summary of Alternative 6 wastewater treatment improvements.*

WWTP	Estimated Upgrade/React. Project Cost	Estimated Exp. Project Cost	Estimated Total Project Cost
#4	$170,000	$1,100,000	$1,270,000
#715	--	--	--
SCSD-1	--	--	--
Subtotal	$170,000	$1,100,000	$1,270,000
Estimated Project Cost			$1,270,000

Note: refer to Tables 5.2-1. through 5.2-5. for basis of project cost estimates used in this table.

5.3. Operation and maintenance costs estimates

The estimated cost of operation and maintenance of the collection and treatment facilities is shown below for each alternative. A cursory estimate of the cost of electric heat and power was made for the SEAD WWTP's because the actual cost of utilities for the existing plants was unavailable through the Army.

Note that in Alternative 3, the Correctional Facility wastewater would be treated at the SCSD-1 WWTP at Willard. The estimated O&M cost for this wastewater was based on the current rate charged to existing institutional users in SCSD-1.

The following six tables summarize estimated operation and maintenance costs for each alternative.

Table 5.3-1. *Alternative 1 operation and maintenance cost estimates.*

Category	Item	Collection	Treatment
Manpower		$6,000	$84,000
Utilities	Heat	--	4,000
	Power	--	23,000
	Telephone	--	1,000
Analytical		--	7,000
Chlorine		--	3,000
Sludge disposal		--	16,000
Allocation for repairs		5,000	2,000
Equipment		--	2,000
Totals		$11,000	$142,000
Total O&M Cost Estimate			$153,000

Table 5.3-2. *Alternative 2 operation and maintenance cost estimates.*

Category	Item	Collection	Treatment
Manpower		$6,000	$99,000
Utilities	Heat	--	4,000
	Power	--	32,000
	Telephone	--	1,000
Analytical		--	7,000
Chlorine		--	5,000
Sludge disposal		--	24,000
Allocation for repairs		5,000	2,000
Equipment		--	2,000
Totals		$11,000	$176,000
Total O&M Cost Estimate			$187,000

Table 5.3-3. *Alternative 3 operation and maintenance cost estimates.*

Category	Item	Collection	Treatment
Manpower	at WWTP #4	$6,000	$42,000
Utilities	Heat	--	2,000
	Power	2,500	4,000
	Telephone	500	600
Analytical		--	3,500
Chlorine		--	--
Sludge disposal		--	20,000
Allocation for repairs		5,000	1,000
Equipment		--	1,000
SCSD-1 user fee *	for treatment O&M	--	154,500
Totals		$14,000	$228,600
Total O&M Cost Estimate			$242,600

** - For SCSD-1 WWTP at Willard O&M costs, the estimate was based on the current non-residential rate of $0.98 per 1000 gallons plus 50% as the Correctional Facility would be an out-of-district customer.*

Table 5.3-4. *Alternative 4 operation and maintenance cost estimates.*

Category	Item	Collection	Treatment
Manpower		$6,000	$92,000
Utilities	Heat	--	2,000
	Power	--	42,000
	Telephone	--	600
Analytical		--	3,500
Chlorine		--	7,200
Sludge disposal		--	16,000

Table 5.3-4. *Alternative 4 operation and maintenance cost estimates (continued).*

Category	Item	Collection	Treatment
Allocation for repairs		5,000	1,000
Equipment		--	1,000
Totals		$11,000	$165,300
Total O&M Cost Estimate			$176,300

Table 5.3-5. *Alternative 5 operation and maintenance cost estimates.*

Category	Item	Collection	Treatment
Manpower		$6,000	$57,000
Utilities	Heat	--	2,000
	Power	2,500	6,000
	Telephone	500	600
Analytical		--	3,500
Chlorine		--	--
Sludge disposal		--	24,000
Allocation for repairs		5,000	1,000
Equipment		--	1,000
Totals		$14,000	$95,100
Total O&M Cost Estimate			$109,100

Table 5.3-6. *Alternative 6 operation and maintenance cost estimates.*

Category	Item	Collection	Treatment
Manpower		$6,000	$42,000
Utilities	Heat	--	2,000
	Power	2,500	4,000
	Telephone	500	600
Analytical		--	3,500
Chlorine		--	--

Table 5.3-6. *Alternative 6 operation and maintenance cost estimates (continued).*

Category	Item	Collection	Treatment
Sludge disposal		--	16,000
Allocation for repairs		5,000	1,000
Equipment		--	1,000
Totals		$14,000	$70,100
Total O&M Cost Estimate			$84,100

5.4 Summary of costs

The following table summarizes the cost estimates presented in the preceding three subsections, by alternative.

Table 5.4-1. *Summary of costs by alternative.*

Alt.	Collection (Cap. $) (1)	Treatment (Cap. $) (1)	Debt service *	O&M	Total annual cost (2)
1	$1,453,000	$1,236,000	$242,000	$153,000	$395,000
2	1,248,000	2,443,000	332,200	187,000	519,200
3	2,205,000	2,421,000	** 416,300	242,600	658,900
4	1,441,000	2,110,000	319,600	176,300	495,900
5	1,298,000	2,220,000	316,600	109,100	425,700
6	1,711,000	1,270,000	268,300	84,100	352,400

Notes: 1. Cap. $ - capital cost of improvement.
2. The total annual cost is the sum of the estimated debt service and the O&M cost estimate for each alternative.
** - The maximum annual debt service for collection and treatment improvements, if bonded, is based on municipal bonding for 20 year period at 5% interest.*
*** - Only the debt service on the SCSD-1 WWTP at Willard expansion was included. Existing debt service is allocated to existing units.*

The estimated annual cost savings for a modified Alternative 3, which would provide for the exclusion of South End sanitary sewer I/I, would be approximately $50,000. Therefore, since this amount would not bring Alternative 3 close to being the most cost-effective solution, it was not presented.

6. Property and utility ownership issues

6.1. Background

At the present time, the U.S. Army owns the SEAD property and wastewater facilities which are the subject of this report. Seneca County Sewer District No.1 owns the Ovid trunk sewer, from the Village of Ovid to the flow meter adjacent the State's Drug Treatment Center, as well as the WWTP at Willard. Development of a new State Correctional Facility, together with the dissolution of the Seneca Army Depot, will require new ownership of the Depot's wastewater infrastructure. In addition, wastewater service must be maintained to existing customers in the hamlet of Romulus. Note the Army presently has an agreement with the Seneca County Sewer District No. 1 for operation of WWTP #4 and most SEAD wastewater pumping stations, as well as for treatment of wastewater at the Willard WWTP generated in the Lake Housing Area.

Tentative plans by the State Department of Corrections call for the transfer of some 700 acres by the Army directly to the State for a maximum security correctional facility. This site is in the southeastern portion of the SEAD.

Although the State has indicated it would provide and operate flow equalization and pumping facilities at a Correctional Facility site, it is not interested in owning or operating wastewater treatment works.

6.2. Municipal district needs

To provide for continuity of service to the hamlet of Romulus and to provide necessary service to new Depot property owners, including the Correctional Facility, a new County sewer district should be considered. Since the Depot was established from lands of the Towns of Romulus and Varick, the establishment of a County sewer district coinciding with the Depot boundary will establish the necessary vehicle to provide and maintain wastewater service as required.

A new Seneca County Sewer District No. 2 would establish user costs for all district customers, as well as out-of district customers (the existing hamlet's two Town Sewer districts). The creation of this district will also permit improvements to be made both initially as well as in the future, with the cost thereof being borne by the district.

In order to permit the district to function and operate, rules and regulations should be drafted and implemented covering topics such user rates, improvements and repairs, connection fees and rules, sewer use ordinance, and other related topics. Current rules and regulations in use, such as the Sewer District No. 1 Sewer Use Ordinance, may be adopted.

It is recommended that all wastewater infrastructure facilities to be transferred be adequately insured during and after the transactions.

6.3. Utility ownership options

6.3.1. Wastewater facilities

SEAD wastewater facilities consist of WWTP #4, WWTP #715, gravity collection sewers, pumping stations, and individual building service laterals. It is recommended that the wastewater facilities which are to be incorporated into the selected plan (selected alternative) be transferred to the proposed County Sewer District No. 2. Operation of the facilities may be contracted by the District to a firm that specializes in such service and has a proper operator's license. This is similar to what is currently being done by the County Sewer District No. 1.

For those facilities which are outside the scope of this Phase 2 report, including South End and Lake Housing Area sanitary sewers, transfer needs should be addressed prior to the Army's departure.

The South End WWTP #4 will continue to provide treatment to the hamlet of Romulus. Therefore, the Plant and associated works, including the wetland that constitutes the tertiary treatment, should be transferred to proposed County Sewer District No. 2.

Private ownership of the SEAD wastewater facilities would also be possible if a Sewage-works Corporation were created under the State's Transportation Corporations Law. The local municipalities have a right to consent to this, and would contract with the Corporation for wastewater service.

Ownership and operation of sanitary facilities on the Correctional Facility site, including the pumping station and flow meter are recommended to be by the State.

Note that the hamlet of Romulus' 6-inch diameter sewage force main, which traverses Depot lands enroute to WWTP #4, should remain under the ownership of the existing Town of Varick Sewer District.

6.3.2. Electrical and telecommunication systems

The operation of wastewater treatment and pumping facilities will require electric power and telecommunication service. Transition of these facilities from the Army to a suitable utility will be required. Alternatives for future ownership of the electric distribution system supplying the Depot include New York State and Electric and Gas Corporation (NYSEG), another investor-owned electric utility, or a municipal utility. Any entity that becomes owner of the electric system would be considered a utility by the PSC since it would be selling power to end users.

The potential owners of the telecommunication system that would service the wastewater facilities include only the two firms which currently have telecommunications facilities in the area: Bell Atlantic and Trumansburg Home Telephone Company. To make a final determination as to which firm should serve which area, it is recommended that proposals be solicited for serving each of the SEAD's three separate areas.

Further discussion on the alternatives for power and telecommunication system ownership can be found in Sections 6.3.2. and 6.3.3. of the "Phase 1 SEAD Utility Transition Plan" by O'Brien & Gere.

6.4. Access and easements

The SEAD property on which all wastewater infrastructure exists should be reserved with the system transfer. The expansion of SEAD WWTPs will require land adjacent the existing facilities. Therefore, transfer of property must provide for the necessary space for expansion, as well as the existing facilities.

In the case of structures, it is recommended that fee parcels be held in the name of the district, as summarized in Table 6.4-1. In the event the district has not been established at the time of transfer, suitable provision for title should be made until the district is formed. Suitable provision should also be made for property requirements for the electric and telecommunications systems. Note there are other SEAD sewage pumping stations outside the scope of this Phase 2 report that are not listed.

Table 6.4-1. *Summary of required fee parcels.*

Facility	Comment
WWTP #4	including the wetland and sufficient land for required expansion
WWTP #715	for interim use by KidsPeace, and possible future use
Elliot Acres pumping station	
New North End pumping station	part of WWTP #715 site, for Alternatives 3, 5 & 6
Electric substation	near the SEAD main entrance

To provide necessary access to these facilities over Depot lands which may eventually become property of others, permanent access easements should be retained. Similar access will be needed for the network of pipelines and appurtenances. Roadway access to the selected WWTP and pumping stations taken over by a public district should be assured regardless of future ownership of SEAD property. If the roads to these facilities are not dedicated to the Towns, blanket access easements should be transferred to the proposed District or other suitable County agency in the interim if District formation lags transfer. Roadway access easements should also provide for adequate road maintenance and snow removal responsibilities as appropriate. Since some utilities are routed through the "Q" Area, access to this area will also be needed.

To provide for access and repair of buried infrastructure, pipeline easements should be reserved. They should be centered on the lines, be at least 30-feet in width, and extend over the entire length of the sanitary system. A 30-foot wide sanitary easement should be retained on Depot land for the hamlet of Romulus 6-inch diameter sewage force main.

The force main for Alternative 3 (not selected) was planned to be constructed within existing road and highway rights-of-way, existing trunk sewer easements, and newly acquired sanitary easements to the east and south of the Drug Treatment Center. Easement acquisition is not required as Alternative 3 is not to be implemented. Note that plant expansion at the SCSD-1 WWTP at Willard would not be expected to require additional land.

Access and easements are also needed for the electrical power distribution system taken over by the utility purveyor.

6.5. Intermunicipal agreements

In order to provide wastewater operations discussed above, including providing for the necessary off-site service, the following table lists municipal or agency agreements which should be secured subject to the alternative selected. It is suggested these agreements be of relatively long term with appropriate cost negotiation parameters set forth therein. Note we have shown a County district as the agency responsible to negotiate these agreements. As customers of the new district, separate agreements are not required with the Correctional Facility, KidsPeace or other users within the district boundaries.

Table 6.5-1. *Summary of potential municipal or agency agreements.*

Between	and	For
County Sewer District No. 2	Town of Varick Sewer District *	Wastewater treatment
		Transportation of wastewater from the Elliot Acres PS (Alt's. 1,4, & 6)
	Third party	Operation of facilities
	U.S. Army	Wastewater treatment **
	Town of Romulus Sewer District	Transportation of wastewater from the Elliot Acres PS (Alt's. 1,4, & 6)
	Seneca County Sewer District No. 1	For treatment of Lake Housing wastewater
		Treatment and transmission (Alt. 3 only)

** - the Town of Varick has an intermunicipal agreement with the Town of Romulus for wastewater service.*
*** - to provide service until Depot closure.*

In the above table, the U.S. Army is shown as a customer of the proposed District. Since individual SEAD buildings are not presently metered for

water, an equitable arrangement for payment of sewer use charges must be resolved.

7. Conclusions and recommendations

Future use of SEAD wastewater facilities will require that a new owner be identified. At the same time, the existing infrastructure system must be maintained to provide the necessary interim service. Plans to implement the recommended alternative improvements must also be made by the new owner to provide for the required service to KidsPeace and the Correctional Facility by the time it is required.

The following subsections identify the conclusions and recommendations in this regard.

7.1. Conclusions

Future wastewater conveyance and treatment needs have been identified for the planned Correctional Facility and other sources tributary to and in the vicinity of the SEAD property. In consideration of the future needs, existing conveyance and WWTPs have been evaluated. This included the inactive WWTP #715, the active WWTP #4 and the SCSD-1 treatment facility at Willard. During the course of the evaluation, the SEAD sites were visited and overall observations were made relative to long-term use. In the case of the inactive WWTP #715, modifications have been identified for reactivation. In the case of WWTP #4, recommendations have been made relative to upgrading this facility for long-term use. The SCSD-1 treatment facility currently is in good operating condition.

An evaluation of each of the these three WWTPs relative to Ten States Standards, which are used by NYSDEC, was prepared. For both SEAD WWTPs, a discrepancy was identified between the rated flow capacities and the recommended Ten States Standards levels. This indicates a significant difference for the SEAD WWTPs as follows:

Table 7.1-1. *Comparison of WWTP rated capacities.*

WWTP	Rated flow, gpd	Ten States Standards rated capacity, gpd
#4	252,000	161,250
#715	300,000	107,000
SCSD-1 @ Willard	700,000	700,000

In addition to the above comparison, the effluent discharge limits from WWTP #715, due to the receiving stream, are more stringent than those related to WWTP #4. These limits obviously would have an impact on the cost of upgrade and/or expansion for future flows. A significant concern for the SEAD WWTPs are the current I/I quantities in the collection systems tributary to these WWTPs. Review of previous DMRs and discussions with NYSDEC inspection personnel indicate that I/I flows are extremely high.

Based on the wastewater treatment needs and the current facilities, six alternatives were developed for review. Evaluation included consideration of the following criteria:

- geographic location of wastewater sources
- current capacity of conveyance and WWTPs
- current age and long-term usefulness of WWTPs
- potential for future WWTP expansion
- conceptual capital and operating costs
- current and future SPDES discharge permits
- regulatory requirements
- infiltration/inflow considerations

7.2. Recommended alternative

Capital and O&M costs were prepared for reactivation, upgrade and expansion of the WWTPs to match the six alternatives. In addition, collection system modifications were also estimated. Total annual costs as presented in Section 5 were prepared for each of the six alternatives.

The recommended alternative to provide the hamlet of Romulus, the Correctional Facility, KidsPeace, and other identified wastewater demands with wastewater service is Alternative 6, which provides for treatment of all wastewater at WWTP #4. The selection of this alternative is based on the least estimated annual cost. Alternative 6 includes the elimination of I/I in the South End and treatment of all SEAD flows at WWTP #4.

Alternative 6 requires collection system improvements consisting of force mains, a North End pumping station, and treatment facility improvements as shown on Figure 6. WWTP #4 work would expand the treatment facility from the Ten States Standards level of 161,250 gpd to 433,000 gpd to

handle all identified future SEAD flows. The assumptions related to this evaluation include Ten States Standards level treatment facilities would be required, and that discharge to the receiving water and the related effluent limitations of Kendig Creek would be achieved through permit No. 001. Additional considerations would be: discussions with NYSDEC; further evaluation of I/I; and further consideration of non-economic factors.

The recommended alternative has an estimated total project cost of $2,981,000 and an estimated annual operation and maintenance cost of $84,100. The following table summarizes costs associated with this alternative.

Table 7.2-1. *Summary of recommended Alternative 6 cost estimates.*

Category	Item	Est. Cost
Capital costs		
Project Cost	Collection improvements	$1,711,000
	Treatment improvements	1,270,000
	Total	$2,981,000
Annual costs		
Debt service	Max. annual	$268,300
O&M	Collection improvements	$14,000
	Treatment improvements	$70,100
Total Est. Annual Cost		$352,400

7.3. Implementation requirements

Public ownership is recommended to be implemented by forming a new County sewer district within the boundaries of the Seneca Army Depot. This would obligate those future property owners and users in the new district to bear the costs related to operation of the facilities. Future infrastructure extensions and improvements needed for development on the Depot lands should be funded by the developer.

The following summarizes our recommendations:

1. Issue this report to NYSDEC for review and concurrence.

2. The IDA should request the County Board of Supervisors to form

a County Sewer District No. 2 to provide the necessary vehicle for ownership, collection and treatment of sewage. The Town of Varick Sewer District and in turn the Town of Romulus Sewer District (together serving the hamlet) would be charged as an outside residential customer. The Lake Housing Area, which currently receives wastewater service at the WWTP at Willard, would continue to be an outside customer of SCSD-1.

3. Pursue potential sources of funding assistance for the proposed improvements, such as the NY State Clean Water State Revolving Fund (CWSRF) or possibly the USDA Rural Development Agency.

4. Negotiate the required intermunicipal and other agreements. Coordinate with the Army relative to the transfer of required facilities.

5. Prepare materials for District creation, including a Plan, Project Description, Financing Plan, and Boundary Description of the District.

6. The County should establish the District and obtain NYS Audit and Control approval. An administrative Sewer District Board should be established by the County. Since a Sewer Board is already in existence, the possibility of using the same administrative Board for Sewer District No. 2 should be considered.

7. County Sewer District No. 2 should:

   a. assume ownership of both SEAD WWTP's and the SEAD sanitary sewer system. WWTP #715 will be needed for KidsPeace as an interim measure until the recommended improvements are completed. In addition, WWTP #715 may be used in the future if, for example, a major user or developer decided to locate in the North End.

   b. provide for continued operation and maintenance of WWTP #4, during construction of treatment plant expansion, and for interim operation of WWTP #715 until the improvements are ready to go on-line.

The ownership of the Lake Housing Area sanitary sewers should be resolved, as this was outside the scope of this phase. The Town of Varick has indicated interest in using this system for transportation to the WWTP at Willard.

The Town of Varick would continue to own its force main to WWTP #4.

8. County Sewer District No . 2 should establish operating Rules and Regulations, including user rates for the hamlet of Romulus and requirements for future connections to the system.

9. The County Sewer District No. 2 should undertake the recommended improvements. Inflow source identification and removal should be addressed as required.

10. Resolve all property transition arrangements, including property ownership, easements, and utility service (electric and telephone).

11. Provide for maintenance of insurance on transferred facilities during all phases of transition (from the Army to the IDA to the County Sewer district).

12. Coordinate with the NYS Department of Environmental Conservation to issue WWTP discharge (SPDES) permits in the name of the new owner.

13. Conduct infiltration/inflow investigations in the South End sanitary sewers or plan to isolate these sewers upon Depot closure. Inflow identification and rehabilitation is stressed as an important part of the take over. A good time to smoke test, dye test, inspect buildings, and make sewer system repairs is when the buildings are vacant, thereby minimizing disruptions to building occupants.

14. Prepare Contract Documents for all improvements required under Alternative 6, plus interim operation of WWTP #715.

Isolation of South End sewers, following the Army's departure, is included in the recommended plan. Pending I/I identification and rehabilitation, the impact of isolating the I/I flow (by plugging the South End sewer at WWTP #4) on the sewer system and on the South End buildings must be addressed as part of future work.

7.4. Miscellaneous recommendations

The following outlines miscellaneous recommended items to be addressed as part of the conveyance of each of the facilities:

1. The need to construct additional or excess treatment capacity as part of the recommended alternative improvements should be considered. This would provide for other future development. The identification of such development was not part of the scope of this project.

2. The sites of the WWTP's should be dedicated to the sewer district. Because the wetland adjacent to WWTP #4 is part of the treatment process, as required by the SPDES Permit, this land should be included in the dedication to the sewer district.

3. Blanket easements for access will be needed for sewer district, electric utility, and telecommunication utility(s) personnel to service, maintain and improve the respective infrastructure. The access requirement is two-fold: while the Army is still present, its security issues must be followed, especially in the Ammunition and "Q" Areas. After the Army departs, this access will need to be maintained over "common" lands initially, and over lands that may be leased/sold to others, such as developers and commercial business owners.

4. Roadway access to each plant and pumping station taken over by the District should be assured regardless of future ownership of SEAD property. If the roads to these facilities are not dedicated to the Towns, required access easements should be transferred to the District. Roadway access easements should also provide for road maintenance and snow removal responsibilities.

5. The County sewer district should coordinate with the telephone company(s) to establish the necessary communication links needed for the wastewater system. This may include converting the existing links to leased lines. The following links will be needed under Alternate 6:

    a. Telephone service for WWTP #4;

b. Interim telephone service to WWTP #715.

c. An alarm service for the new North End pumping station; and

d. An alarm service for the Elliot Acres pumping station.

The Lake Housing pumping stations were excluded from the scope of this phase.

6. Ownership and operation of the Coast Guard facilities should be turned over to the Coast Guard to implement on-site disposal plans as warranted. This will allow the pumping station to be decommissioned and disconnected from the SEAD sanitary sewer system.

7. The sewer district should retain an easement for the hamlet of Romulus force main.

8. WWTP operation will require potable water service. The Army's water system transfer and service to the WWTPs should be secured. Refer to the "Phase 1 SEAD Utility Transition Plan" report for further reference.

Table A

SEAD S/E WWTP #4 -
Basis of Design
(Existing treatment works)

Influent Structure

Flow Monitoring Manhole

Number	1
Type	Concrete manhole
Accessories	Internal flume and flow monitoring element/transmitter with bracket

Parshall Flume

Number	1
Type	Prefabricated fiberglass liner
Accessories	Flow monitor element/transmitter and bracket

Bar Screen

Number	1 with 12 bars (11 clear spaces)

Straight-line Aerated Grit Chamber

Number	1
Type	Inclined chamber

Grit Screw Conveyor

Number	1
Accessories	Shelter, collection bucket, screw drive/motor, gear box, drive belt, and hand switch/starter

Aeration Blower

Number	1
Accessories	Blower motor, hand switch/starter, & shelter

Adjustable Diffuser Unit

Number	1

Comminutor

Number	1
Accessories	Motor, gear reducer, and hand switch/starter

By-Pass Bar Screen

Number	1 with 12 bars (11 clear spaces)

Influent Structure (Continued)

Table A

SEAD S/E WWTP #4 -
Basis of Design
(Existing treatment works)

Parshall Flume	
Number	1
Type	Prefabricated fiberglass liner
Accessories	Flow monitor element/transmitter and bracket, and sampling tube bracket
Composite Sampler	
Number	1
Accessories	Sample tubing and prefabricated shed
Influent Pump Structure	
Type	Subsurface concrete wet well (adjacent brick building containing influent pumps)
Dimensions	6 ft W x 2 ft 10 in L x 7 ft 3 in D
Influent Pumps	
Number	2
Accessories	Motor and hand switch/starter
Imhoff Tank	
Number	1
Overall Tank	
Capacity	184,650 gal
Dimensions	50 ft L x 25 ft W x 27 ft 3 in D
Surface area	1140 sf
Freeboard	1 ft 6 in
Settling Compartments	
Number	6 compartments: 3 L x 2 W
Capacity	Total compartments: 46,310 gal
Dimensions (per compartment)	15 ft 10 in L x 12 ft W x 10 ft 6 in D each
Total surface area	Total compartments: 807.5 sf
Digestion Compartment	
Capacity	138,340 gal
Dimensions	50 ft L x 25 ft W x 27 ft 3 in D
Total surface area	1,140 sf
Gas Vent Area	
Surface area	332.5 sf, 30 % of total surface
Accessories	8 in dia. sludge withdrawal (gravity) piping
Trickling Filter	
Number	1
Type	Circular concrete

Table A

SEAD S/E WWTP #4 -
Basis of Design
(Existing treatment works)

Capacity	83,960 gal
Dimensions	Overall tank: 50 ft dia. x 6 ft 9 in D
	Filter media: 50 ft dia. x 3 ft 2 in D (6,136 cf)
	Underdrain: 50 ft dia. x 2 ft 7 in D (5,105 cf)
Surface area	1,960 sf
Accessories	2 ft dia. center rotary distributor tower with 6 in dia. inlet pipe, 4 rotating distribution arms (clockwise rotation), filter media, and filter underdrain

Secondary Settling Tank

Number	1
Type	Rectangular concrete (2 parallel channels)
Capacity	22,860 gal
Dimensions	Total: 30 ft L x 21 ft 6 in W x 6 ft 9 in D
	Each channel: 30 ft L x 10 ft W x 6 ft 9 in D
	Eff. weir: 12 lf total @ 694.5 ft elev.
Surface area	Total tank: 645 sf

Effluent Structures

Flow Monitoring Manhole

Number	1
Type	Concrete manhole
Accessories	Internal flume
	Flow monitor element/transmitter and bracket

Flow Meter Shed

Number	1
Type	Precast fiberglass shelter
Accessories	Flow meter and power supply

Table A

SEAD S/E WWTP #4 -
Basis of Design
(Existing treatment works)

Sludge Drying Bed

Number	1 (split into two beds by center dividing wall)	
Type	Sand/gravel lined bed	
Capacity	Total:	62,930 gal
	Sludge capacity:	35,123 gal (4,695 cf)
	Sand:	10,062 gal (1,345 cf)
	Gravel (approx.):	17,745 gal (2,372 cf)
Dimensions	Total (2 beds):	49 ft L x 81 ft W x 3 ft D
	Each bed:	49 ft L x 40 ft W x 3 ft D
	Each trough:	49 ft L x 6 ft W x 5⅜ in D
	Perimeter walls:	1 on 2 slope
Surface area	Total bed:	3920 sf
Accessories	4 in dia. and 8 in dia. drain piping	

Table B

SEAD S/E WWTP #4 -
Ten States Standards Design Criteria Comparison

Design Criteria	Parameter	Ten States Standards or Text Recommendations[1]	Value for Existing Facilities[2]	Meets or Exceeds Standard
Imhoff Tank				
Dimensional	Tank Depth (D): Surface to bottom	Range: 24 to 32 ft [3] Typical: 30 ft [3]	25 ft 9 in	Yes
	Settling Compartment: Length-to-Width Ratio	Range: 2:1 to 5:1 [3] Typical: 3:1 [3]	4.2:1	Yes
	Gas Vent Area: Surface Area	Range: 15-30 % of total surface [3] Typical: 30% [3]	30%	Yes
	Gas Vent Area: Width of Opening	Range: 18-30 in [3] Minimum: 18 in [3]	21 in each	Yes
	Digestion Section: Volume	Range: 63,590 to 111,280 gal [3] Typical 79,485 gal [3]	138,340 gal	Yes
Operational	Settling Compartment: Surface Overflow Rate	Range: 600 - 1,000 gpd/ft^2 [3] Typical: 800 gpd/ft^2 [3]	1000 gpd/ft^2 at hourly flowrate at a peaking factor of 3.2 [4]	Yes
	Settling Compartment: Detention Time	Range: 2 to 4 hr [3] Typical 3 hr [3]	4.4 hr	Yes
	Unit Process Maximum Design Flowrate	Based on a hydraulic loading of 1,000 gpd/ft^2 at hourly flowrate at a peaking factor of 3.2 [4]	252,000 gpd	
Trickling Filter				
Dimensional	Side Water Depth (D)	Minimum: 6 ft, above the underdrain Maximum: 10 ft	Approx. 3 ft 2 in	See footnote (5)
	Freeboard	Minimum: 4 ft	1 ft	See footnote (5)
	Clearance Btw. Media and Distribution Arms	Minimum: 1 ft	1 ft	Yes
	Underdrain Slope	Minimum: 1 percent	1 percent	Yes
Operational	Hydraulic Loading	Range: 0.16 to 0.64 gpm/ft^2 [6]	0.35 gpm/ft^2	Yes
	Organic Loading	Range: 30 to 100 lb/day*10^3 ft^3 [6]	95.4 lb/day*10^3 ft^3	Yes
	Unit Process Maximum Design Flowrate	Based on a max. organic loading of 100 lb/day*10^3 ft^3	261,986 gpd	

Table B

SEAD S/E WWTP #4 -
Ten States Standards Design Criteria Comparison

Design Criteria	Parameter	Ten States Standards or Text Recommendations[1]	Value for Existing Facilities[2]	Meets or Exceeds Standard
Secondary Settling Tank				
Dimensional	Side Water Depth (D)	Minimum: 10 ft	6 ft 9 in	**No**
	Length of Flow	Minimum (Inlet to Outlet): 10 ft	Approx. 30 ft	Yes
Operational	Surface Overflow Rate	Average: 400 to 600 gpd/ft^2 [7] Peak Hourly: 1,000 gpd/ft^2	387.6 gpd/ft^2 1,550 gpd/ft^2	Yes **No**
	Weir Loading	Average: 10 to 20,000 gpd/ft [7] Peak Hourly: 20,000 gpd/ft	20,833 gpd/ft 83,333 gpd/ft	**No** **No**
	Unit Process Maximum Design Flowrate	Based on a max. surface overflow of 1,000 gpd/ft^2 at peak hourly flowrate	161,250 gpd	

Footnotes:
(1) Criteria not stated in Ten States Standards were obtained from other sources which are footnoted below.
(2) Operational statistics based on estimated maximum capacity of 252,000 gpd.
(3) Metcalf & Eddy, Wastewater Engineering, Third Edition, Page 1079, Table 14-19 & WEF Manual of Practice No. 8, Design of Municipal Wastewater Treatment Plants, Volume I, Page 498, Table 10.13.
(4) Ten States Standards does not specifically establish requirements for Imhoff tanks. For a capacity of 252,000 gpd, Ten States Standards recommends utilizing a peaking factor of 4 to establish peak hourly flows. Since flow equalization will be provided for wastewater flows originating at the Correctional Facility, the peaking factor was modified to 3.2.
(5) The existing value does not meet the standard established for open trickling filters. However, based on existing satisfactory operation and the presence of a geodesic dome cover, the existing side water depth dimension was considered acceptable.
(6) Metcalf & Eddy, Wastewater Engineering, Third Edition, Page 615, Table 10-13.
(7) Metcalf & Eddy, Wastewater Engineering, Third Edition, Page 588, Table 10-12.

Table C

SEAD S/E WWTP #4 - Condition Assessment - September 3, 1998

Component	Condition	Recommendation
Site - general	• Vegetation overgrowth • Lack of site fencing • Insufficient equipment dry storage and maintenance activity facilities	• Cut grass/weeds • Installation of fencing • Build an equipment garage/maintenance shop
Influent structure	• Solids accumulation within channels	• Removal of solids with influent channels • Upgrade and repair of concrete
Control Building	• Control Room does not meet Ten States Standards or electrical codes (due to presence of influent pumps) • Influent pump control floats antiquated • Laboratory outdated	• Isolation of influent pump area within control room from rest of Control Building • Upgrade ventilation and electrical systems to meet Class 1 Group D electrical standards • Replace pump control floats • Upgrade of the laboratory
Imhoff tank	• Good physical condition • Overall general good working condition • Scum removal not operational	• Modification of piping to permit effective removal of scum
Trickling filter	• Generally good working condition • Algae growth and insufficient exhaust	• Removal of algae growth • Improvement of filter exhaust
Distribution manhole	• Deteriorating manhole	• Reconstruct manhole
Secondary settling tank	• Solids accumulation within tank and effluent channel • No mechanical sludge removal equipment	• Removal of solids from within the tank and effluent channel • Installation of mechanical sludge withdrawal equipment
Sludge drying bed	• Poor physical condition and sludge build up	• Clean out and recondition beds

Table D

SEAD N/E WWTP #715 -
Basis of Design
(Existing treatment works)

Influent Structure

Comminutor

Number	1
Connection size	10 in influent / 10 in effluent
Dimensions	4 ft L (influent to effluent flange)
Accessories	Motor, gear reducer, and hand switch/starter

By-Pass Bar Screen

Number	1
Dimensions	Unit: 3 ft L x 2 ft W x 3.25 ft D Bars: 4 ft 9 in L x 2 in W x 11¼ in D, 2 in clear spacing between bars

Straight-line Aerated Grit Chamber

Number	1
Type	30 degree inclined chamber
Capacity	1,700 gal
Dimensions	23 ft ¼ in L x 3 ft W x 9 ft 1 in D
Surface area	69.1 sf
Accessories	Removable cover plate, adjustable weirs, and plate baffle with scum ports

Grit Screw Conveyor

Number	1
Dimensions	Screw: 9 in dia. x 30 ft 6 in L Trough: 1 ft 3 in dia. x 30 ft 6 in L
Accessories	Steel trough, screw drive/motor, gear box, drive belt, and hand switch/starter

Aeration Blowers

Number	2 (1 installed stand-by)
Accessories	Blower motor and hand switch/starter

Adjustable Diffuser Unit

Number	1
Size	2 in dia. air piping with 4 diffusers per unit
Dimensions	Horizontal arm air pipe: 2 in dia. x 2 ft 9 in L Vertical arm air pipe: 2 in dia. x 7 ft 6 in L

Table D

SEAD N/E WWTP #715 -
Basis of Design
(Existing treatment works)

Influent Structure (Continued)

Parshall Flume

Number	1
Type	Prefabricated fiberglass liner
Dimensions	Channel: 4 ft L x 2 ft W x 2 ft D
	Flume throat: 3 in W x 2 ft 2¼ in D
	Flume inlet: 1 ft 8 in W x 2 ft D
	Flume outlet: 6 in W x 2 ft 1 in D
Accessories	Flow element/transmitter bracket
	Sample tubing bracket

Flow Meter

Number	1

Sampler

Number	1
Type	Refrigerated composite sampler
Accessories	Sample tubing

Main Treatment Structure

Primary Settling Tank

Number	1
Type	Rectangular concrete
Capacity	61,600 gal
Dimensions	Tank: 45 ft L x 15 ft W x 14 ft D
	Eff. trough: 4 @ 7.5 ft L x 1 ft W x 1 ft D
	Eff. weir: 60 lf total @ 606.5 ft elev.
	90° v-notch (4 in W x 2 in D)
Surface area	550 sf
Accessories	Traveling bridge scraper collector with scraper and skimmer mechanisms, traveling bridge motor/drive unit, collector motor, effluent trough with v-notch weirs, scum beach and trough, and 2 submersible waste sludge pumps

Table D

SEAD N/E WWTP #715 -
Basis of Design
(Existing treatment works)

Main Treatment Structure (Continued)

Rotating Biological Contactor Tanks #1 and #2

Number	2
Type	Rectangular concrete with covers
Capacity	13,615 gal
Dimensions	One tank: 26 ft 4 in L x 14 ft 4 in W x 8 ft D Shaft per tank: 1 shaft per tank, 26 ft L each Media per shaft: 2 media separated by bulkhead per shaft, each media 12 ft dia. x 12 ft L Eff. weir tank 2: 11 ft 8 in total @ 605.5 ft elev.
Surface area	377.4 sf per tank
Accessories	2 drive unit/motors, 2 shafts, 2 bearings supports, 4 media, 2 bulkhead and 2 tank covers

Secondary Settling Tank

Number	1
Type	Rectangular concrete
Capacity	67,300 gal
Dimensions	Tank: 56 ft 4 in L x 15 ft W x 14 ft 3 in D Eff. trough: 4 x 10 ft L x 1 ft W x 1 ft D Eff. weir: 80 lf total @ 605.0 ft elev. 90° v-notch (4 in W x 2 in D)
Surface area	704.2 sf
Accessories	Traveling bridge siphon sludge collector, siphon mechanism with v-plow and orifice, traveling bridge motor/drive unit, siphon motor, effluent trough with v-notch weirs, and scum beach and trough

Sand Filter

Number	1
Type	Rectangular concrete - automatic backwash
Capacity	6,000 gal
Dimensions	Tank: 21 ft 3 in L x 9 ft W x 4 ft 9 in D Eff. weir: @ 603.5 ft elev.
Surface area	191.3 sf
Accessories	Traveling bridge with automatic backwash mechanism, traveling bridge motor/drive unit, washwater waste hood, washwater waste pump, and backwash pump, washwater and backwash waste troughs, sand, and filter drain assembly

Table D

SEAD N/E WWTP #715 -
Basis of Design
(Existing treatment works)

Main Treatment Structure (Continued)

Chlorine Contact Tank

Number	1
Type	Pyramidal concrete
Capacity	25,180 gal
Dimensions	5 ft L x 15 ft W x 15 ft D
	Eff. weir: 60 lf total @ 597.83 ft elev.
Surface area	225 sf
Accessories	Chlorinator, effluent water chlorine booster pump motor and hand switch/starter, and 2 chlorine cylinders

Sulfur Dioxide Mix Tank

Number	1
Type	Rectangular concrete
Capacity	Approx. 270 gal
Dimensions	3 ft L x 3 ft W x approx. 6 ft 9 in D
Accessories	Sulfur dioxide flash mixer with bridge support, 1 in dia. sulfur dioxide diffuser, effluent water sulfur dioxide booster pump motor and hand switch/starter, sulfonator, and 2 sulfur dioxide cylinders

Post Aeration Tank

Number	1
Type	Rectangular channel concrete
Capacity	2,810 gal
Dimensions	35 ft 9 in L x 3 ft W x approx. 6 ft 9 in D
Surface area	107.3 sf

Aeration Blowers

Number	2 (1 installed stand-by)
Accessories	Blower motor, hand switch/starter, and fiberglass shelter

Adjustable Diffuser Unit

Number	1
Size	2 in dia. air piping with 6 diffusers per unit
Dimensions	Horizontal arm air piping: 2 in dia. x 28 ft L

Table E

SEAD N/E WWTP #715 -
Ten States Standards Design Criteria Comparison

Design Criteria	Parameter	Ten States Standards or Text Recommendations[1]	Value for Existing Facilities[2]	Meets or Exceeds Standard
Comminutor				
Operational	Location	Should be located downstream of grit removal equipment and protected by a coarse screening device	Upstream of grit removal equipment and coarse screen in by-pass channel	No
Aerated Grit Chamber				
Operational	Detention time	3 to 5 min at peak hourly flowrate	13 min	Yes
	Unit Process Maximum Design Flowrate	Based on a minimum detention of 3 min at peak hourly flowrate	326,600 gpd	
Primary Settling Tank				
Dimensional	Side Water Depth (D)	Minimum: 10 ft	Approximately 12.5 ft	Yes
	Length of Flow	Minimum (Inlet to Outlet): 10 ft	Approximately 37.5 ft	Yes
	Length (L)	Range: 50 to 300 ft[4] Typical: 80 to 130 ft[4]	45 ft	No
	Width (W)	Range: 10 to 80 ft[4] Typical: 16 to 32 ft[4]	15 ft	Yes
Operational	Surface Overflow Rate	Average: 1,000 gpd/ft^2 Peak Hourly: 1,500 to 3,000 gpd/ft^2	540 gpd/ft^2 2,162 gpd/ft^2	Yes Yes
	Detention Time	Range: 2.21 hr (@7°C)[5] to 3.69 hr (@7°C)[5]	4.9 hr	Yes
	Weir Loading	Range: 10,000 to 40,000 gpd/ft[4] Peak Hourly: 20,000 gpd/ft	5,000 gpd/ft 20,000 gpd/ft	Yes Yes
	Unit Process Maximum Design Flowrate	Based on a max. weir loading rate of 20,000 gpd/ft at peak hourly flowrate	300,000 gpd	
Rotating Biological Contractor Tanks #1 and #2 (2 Stage Series Operation)				
Dimensional	Tank Side Water Depth	Typical: 5 ft[6]	Approximately 6 ft	Yes
	RBC Shaft Length	Maximum: 27 ft with 25 ft of media[6]	27 ft w/25 ft of media	Yes
	Area of Media (1 unit)	High-density: 150,000 ft^2[6]	150,000 ft^2 (Assume)	Assumed
Operational (Combined Nitrification)	Hydraulic Loading	0.375 - 1.0 gpd/ft^2 (@ 7°C)[7]	0.83 gpd/ft^2	Yes
	Organic Loading	0.75 to 1.5 lb BOD_5/10^3 ft^2 x d (@ 7°C)[7]	1.83 lb BOD_5/10^{3}ft^{2}xd	No
	Maximum Organic Loading on First Stage	4 to 6 lb BOD_5/10^3 ft^2 x d (@ 7°C)[7]	7.34 lb BOD_5/10^{3}ft^{2}xd	No
	NH_3 Loading	0.075 to 0.15 lb NH_3/10^{3}ft^2 x d (@ 7°C)	0.313 lb NH_3/10^{3}ft^{2}xd	No
	Detention Time	1.5 to 4 hr	2.2 hr	Yes
	Unit Process Maximum Design Flowrate	Based on a max. NH_3 loading of 0.07 lb NH_3/10^{3}ft^2 x d (@ 7°C)	107,000 gpd	

Table E

SEAD N/E WWTP #715 -
Ten States Standards Design Criteria Comparison

Design Criteria	Parameter	Ten States Standards or Text Recommendations[1]	Value for Existing Facilities[2]	Meets or Exceeds Standard
Secondary Settling Tank				
Dimensional	Side Water Depth (D)	Minimum: 10 ft, greater depth recommended for nitrification plants	14 ft 3 in	Yes
	Length of Flow	Minimum (Inlet to Outlet): 10 ft	Approx. 46 ft 4 in	Yes
Operational	Surface Overflow Rate	Average: 400 to 600 gpd/ft^2 [8] Peak Hourly: 1,000 gpd/ft^2	426 gpd/ft^2 1,704 gpd/ft^2	Yes No
	Solids Loading	Average: 0.6 to 1.0 lb/ft^2 x h [8] Peak Hourly: 1.6 l lb/ft^2 x h [8]	0.013 lb/ft^2 x h 0.052 lb/ft^2 x h	Yes Yes
	Weir Loading	Average: 10 to 20,000 gpd/ft [9] Peak Hourly: 20,000 gpd/ft	3,750 gpd/ft 15,000 gpd/ft	Yes Yes
	Unit Process Maximum Design Flowrate	Based on a max. surface overflow of 1,000 gpd/ft^2 at peak hourly flowrate	211,250 gpd	
Sand Filter				
Operational	Filtration Rate	Peak Hourly: Max. 5 gpm/ft^2	4.36 gpm/ft^2	Yes
	Unit Process Maximum Design Flowrate	Based on a maximum filtration rate of 5 gpm/ft^2 at peak hourly flowrate	344,250 gpd	
Chlorine Contact Tank				
Operational	Contact Period	Peak Hourly: Min. 15 minutes	17.4 minutes	Yes
	Unit Process Maximum Design Flowrate	Based on a contact period of 15 minutes at peak hourly flowrate	347,590 gpd	
Dechlorination Tank				
Operational	Contact Period	Peak Hourly: Min. 30 seconds	3.7 minutes	Yes
	Unit Process Maximum Design Flowrate	Based on a contact period of 30 seconds at peak hourly flowrate	554,400 gpd	

Footnotes:
(1) Criteria not stated in Ten States Standards were obtained from other sources which are footnoted below.
(2) Operational statistics based on estimated maximum capacity of 300,000 gpd.
(3) Metcalf & Eddy, Wastewater Engineering, Third Edition, Page 462, Table 9-4.
(4) Metcalf & Eddy, Wastewater Engineering, Third Edition, Pages 475 and 477, Tables 9-7 and 9-8.
(5) Ten States Standards and Metcalf & Eddy, Wastewater Engineering, Third Edition, Page 474, Figure 9-15.
(6) Metcalf & Eddy, Wastewater Engineering, Third Edition, Page 633.
(7) Metcalf & Eddy, Wastewater Engineering, Third Edition, Page 632, Table 10-17.
(8) Metcalf & Eddy, Wastewater Engineering, Third Edition, Page 588, Table 10-12.
(9) Metcalf & Eddy, Wastewater Engineering, Third Edition, Page 591.

Table F

SEAD N/E WWTP #715 - Condition Assessment - September 3, 1998

Component	Condition	Recommendation
Site - general	• Vegetation overgrowth	• Cut grass/weeds
Channels	• Contain debris and solids	• Clean out of all channels
Comminutor	• Motor, starter, gear box, and cutters appear reusable, but require restoration/ refurbishing • Lacking coarse screening (bar screen) upstream of comminutor	• Meggar and lubricate motor • Change oil in gear box • Lubricate gear box • Inspection of cutters upon startup • Installation of bar screen upstream of comminutor
Aerated grit chamber	• Chamber filled with debris/solids	• Clean out chamber
Aerated grit chamber - blowers	• Blowers, motors, motor bearings, air diffusers appear reusable, but require restoration/refurbishing	• Change oil in blower and rotate • Meggar motor and check bearings • Inspect air diffusers
Aerated grit chamber - grit screw	• Grit screw and drive belt appear to be in poor condition • Motor, gear box, and starter appear reusable, but require restoration/ refurbishing	• Replace grit screw • Grease or replace bottom bearing when replacing grit screw • Meggar motor • Change oil in gear box • Lubricate gear box
Parshall flume - sonic flow transmitter	• Sonic flow transmitter appears to be in poor condition	• Replace flow transmitter
Parshall flume - refrigerated sampler	• Sampler appears reusable but requires restoration/refurbishing • Heat-tracing appears to be in poor condition	• Replace sampler tubing • Clean sampler and inspect refrigeration system operation • Construct weather- resistant enclosure • Replace heat-tracing
Primary settling tank	• Tank equipment including traveling collection mechanisms, motors, gear boxes, limit switches, and control panel appears reusable but requires restoration/refurbishing • Scrapper wear edges deteriorated	• Have manufacturer of tank equipment check operation of equipment and service motors, gear boxes, limit switches, and control panel. • Meggar power cables • Replace scraper wear edges
Rotating biological contactors #1 and #2 (RBC's)	• RBC's appear reusable but require restoration/refurbishing • Gear box apparently leaking • Cover has physical damage	• Meggar and lubricate motor • Drain, flush, and refill oil in gear box • Purge bearings with grease • Perform clear water test run and check media • Repair covers
Secondary settling tank	• Tank equipment including traveling sludge collection mechanisms, motors, gear boxes, limit switches, and control panel appears reusable but requires restoration/ refurbishing	• Have manufacturer of tank equipment check operation of equipment and service motors, gear boxes, limit switches, and control panel. • Meggar power cables

Table F

SEAD N/E WWTP #715 - Condition Assessment - September 3, 1998

Component	Condition	Recommendation
Sand filter	• Filter media is in poor condition • Tank equipment including traveling backwash and washwater mechanisms, pumps, motors, gear boxes, limit switches, and control panel appears reusable but requires restoration/ refurbishing	• Replace filter media • Have manufacturer of tank equipment check operation of equipment and service motors, gear boxes, limit switches, and control panel. • Meggar power cables
Main Treatment Structure	• Generally in good physical condition	• Test building heating and ventilating equipment, replace or add equipment to achieve adequate air quality (filter room my have inadequate ventilation system) • Test unit heaters within building, replace corroded unit heaters within filter room • General cleaning and painting of building
Laboratory	• Outdated and incomplete	• Refurbish laboratory equipment and supplies
Chlorine contact and sulfur dioxide mix (post aeration) tanks	• Tanks appear reusable, but require some minor restoration/refurbishing • All chlorination and de-chlorination equipment previously removed	• Pump out and hose down tanks • Installation of new chlorination and de-chlorination equipment
Sludge pumping station	• Pumps appear reusable, but require some minor restoration/refurbishing • Pump control floats and control panel relays likely will no longer perform	• Remove submersible pumps and have the pumps serviced • Meggar and lubricate motor and replace seals • Meggar power cables • Operate all valves • Inspect pump control floats, replace if necessary • Clean-up control panel equipment and replace relays if necessary • Test panel heater operation and controls
Imhoff tank	• Tank appears reusable, but requires some minor restoration/refurbishing • Tank filled with water and solid debris	• Pump out and dispose of water and solids • Inspect concrete and confirm condition, repair if necessary
Sludge drying bed	• Debris, weed overgrowth with physical deterioration	• Remove weeds and debris • Repair and restore bed • Add new media, if necessary

Table G

SCSD-1 WWTP at Willard -
Basis of Design
(Existing treatment works)

Influent Structure

Influent Screw Pumps

Number	2 (parallel)
Dimensions	42 in dia. screw, 36 ft L, at a 38 degree incline Influent elevation: 483 ft Effluent elevation: 505.08 ft
Accessories	Drive motor, gear assembly, and hand switch/starter

Sluice Gate

Number	2
Accessories	Sluice gate operator

Mechanical Bar Screen

Number	2 (1 in-line and 1 by-pass)
Dimensions	Unit: 1 ft 6 in W x 3 ft 4 in D Bars: 5/16 in W x 2 in D, 2-5/16 in O.C. Clear spacing: 2 in
Accessories	Rake drive unit and rake

Aerated Grit Chamber

Number	1
Type	Rectangular concrete
Dimensions	Approx. 10 ft L x 8 ft 6 in W x 12 ft 7 in D
Surface Area	60 sf
Capacity	5520 gal

Grit Screw Conveyor (In Channel) and Elevator

Number	1
Accessories	Elevator and screw conveyor drive/motor, gear box, drive belt, and hand switch/starter, grit screw, grit buckets

Grit Washing and Dewatering Screw

Number	1
Accessories	Steel trough, screw drive/motor, gear box, drive belt, and hand switch/starter

Adjustable Swing Diffuser Unit

Number	1

Table G

SCSD-1 WWTP at Willard -
Basis of Design
(Existing treatment works)

Influent Structure (Continued)

Aeration Blowers

Number	3 (generate air supply for aerated grit chamber and extended aeration tanks)
Accessories	Motor and hand switch/starter

Extended Aeration Tanks

Number	2 tanks (operate in parallel)
Type	Circular concrete tank with partitions
Dimension	Each tank: 85 ft dia. x approx. 17 ft 8 in D

Extended Aeration Zone

Number	1 each tank
Capacity	350,254 gal
Dimensions	219 degree section of tank x 15 ft 1 in D
Surface area	3,103 sf
Accessories	Diffusers, air piping, air pipe supports, 10 in dia. transfer pipe (to settling zone), and 12 in sluice gate and operator

Settling Zone

Number	1 each tank
Type	Circular
Capacity	53,905 gal
Dimensions	27 ft dia. x 12.58 ft D Eff. weir: 90° v-notch weir @ 498.17 ft elev.
Surface area	573 sf
Accessories	Sludge collector and surface skimmer with motor/drive unit, effluent trough with v-notch weirs, scum trough, and center stilling well

Aerobic Digester Zone

Number	1 each tank
Capacity	62,374 gal (8,338 cf)
Dimensions	39 degree section of tank x 15 ft 1 in D
Surface area	552 sf
Accessories	Sludge return box and weir, and 12 in sluice gate and operator

Table G

SCSD-1 WWTP at Willard -
Basis of Design
(Existing treatment works)

Extended Aeration Tanks (Continued)

Sludge Storage Zone

Number	1 each tank
Capacity	163,132 gal (21,806 cf)
Dimensions	102 degree section of tank x 15 ft 1 in D
Surface area	1,446 sf

Sand Filter

Number	1 (2 parallel channels)
Type	Rectangular concrete - automatic backwash
Capacity	22,967 gal
Dimensions	2 channels @ 32 ft L x 9 ft W x 5.33 ft D
Surface area	576 sf
Accessories	Carriage drive motor, carriage rail, control panel, washwater waste hood, washwater pump and backwash pump, washwater and backwash waste troughs, washwater discharge piping, sand, and porous plate filter drain assembly

Parshall Flume

Number	1
Type	Prefabricated fiberglass liner

Chlorine Contact Tank

Number	1 (2 parallel channels)
Type	Rectangular plug flow
Capacity	Total tank: 33,988 gal
Dimensions	Total tank: 23 ft L x 44 ft W x 5.25 ft D Eff. weir: 6 lf total @ 492.25 ft elev.
Surface area	Total tank: 865 sf
Accessories	1 in dia. chlorine diffuser, chlorine feed water pumps, and chlorinator

Sludge Drying Bed

Number	2 beds (split into 4 compartments per bed)
Type	Asphalt lined bed
Dimensions	Total (2 beds): 196 ft L x 100 ft W x 1 ft 6 in D
Surface area	Total bed: 19,600 sf
Capacity	97,750 gal at maximum recommended sludge application depth of 8 inches based on 10 States Standards

Table H

SCSD-1 WWTP at Willard - Ten States Standards Design Criteria Comparison

Design Criteria	Parameter	Ten States Standards or Text Recommendations[1]	Value for Existing Facilities[2]	Meets or Exceeds Standard
Mechanical Bar Screen (With Parallel By-Pass Bar Screen)				
Operational	Velocity	1.25 to 3 ft/sec at peak hourly flowrate	2.33 ft/sec	Yes
	Unit Process Maximum Design Flowrate	Based on a maximum velocity of 3 ft/sec at peak hourly flowrate	Approx. 0.9 MGD	
Aerated Grit Chamber				
Operational	Detention Time	2 to 5 min at peak hourly flowrate [3]	2.84 min	Yes
	Unit Process Maximum Acceptable Flowrate	Based on a minimum detention of 2 min at peak hourly flowrate	Approx. 0.993 MGD	
Extended Aeration Tanks #1 and #2 (Operate in Parallel): Extended Aeration Zone				
Operational	Organic Loading	15 lb $BOD_5/d/10^3$ ft^3 [4]	15 lb $BOD_5/d/10^3$ ft^3	Yes
	Detention Time	Range: 18 to 36 hours [5]	24 hours	Yes
	Unit Process Maximum Design Flowrate	Based on a maximum organic loading of 15 lb $BOD_5/d/10^3$ ft^3 at average flow	Approx. 0.7 MGD	
Extended Aeration Tanks #1 and #2 (Operate in Parallel): Settling Tank				
Operational	Surface Overflow Rate	1,000 gpd/ft^2	610.8 gpd/ft^2	Yes
	Unit Process Maximum Design Flowrate	Based on max. surface overflow rate of 1,000 gpd/ft^2 at peak hourly flow with a 1.64 peaking factor	Approx. 0.7 MGD	
Rapid Sand Filter - Channels #1 & #2 (Operate in Parallel)				
Operational	Filtration Rate	Average: 1 to 2 gpm/ft^2 [5] Peak Hourly: 3.5 gpm/ft^2 [5]	0.84 gpm/ft^2 3.38 gpm/ft^2	Yes Yes
	Unit Process Maximum Design Flowrate	Based on a maximum filtration rate of 3.5 gpm/ft^2 at peak hourly flow	Approx. 0.725 MGD	
Chlorine Contact Tank				
Operational	Contact Period	15 min at peak hourly flowrate	17.48 min	Yes
	Unit Process Maximum Design Flowrate	Based on a minimum 15 min contact period at peak hourly flowrate	Approx. 0.816 MGD	
Sludge Drying Beds				
Dimensional	Unit Sizing	Area shall be calculated on a rational basis with the volume of wet sludge produced by existing and proposed processes considered: calculated to be approximately 30,000 sf.	19,600 sf	No

Footnotes:
(1) Criteria not stated in Ten States Standards were obtained from other sources which are footnoted below.
(2) Operational statistics based on maximum rated capacity of 700,000 gpd (Based on SPDES Permit).
(3) Metcalf & Eddy, Wastewater Engineering, Third Edition, Page 462, Table 9-4.
(4) Metcalf & Eddy, Wastewater Engineering, Third Edition, Page 1084, Table 14-20.
(5) Ten States Standards and Metcalf & Eddy, Wastewater Engineering, Third Edition, Page 1084, Table 14-20.

I:\DIV09\PROJECTS\10044\21191\DWG\PHASE2\FIG-1.DWG 1=3000

FIGURE 1

LEGEND

- 4"FM — EXISTING FORCE MAIN
- 8" — EXISTING GRAVITY SANITARY SEWER
- EXISTING PUMPING STATION
- EXISTING TREATMENT PLANT
- N — SEWAGE TREATMENT AT NORTH END WWTP
- S — SEWAGE TREATMENT AT SOUTH END WWTP
- W — SEWAGE TREATMENT AT WILLARD WWTP
- PROPOSED PUMPING STATION
- 6"FM — PROPOSED FORCE MAIN
- PROPOSED GRAVITY SEWER REHABILITATION
- SENECA ARMY DEPOT BOUNDARY

PLUG 8" SEWER

NORTH END WASTEWATER TREATMENT PLANT #715
CAP. 300,000 GPD
TO BE REACTIVATED AND UPGRADED

"Q" AREA

P.S. #826

4" FM WITH FLOW CONTROL VALVE TO WWTP #4

PLUG 10" SEWER

SOUTH END WASTEWATER TREATMENT PLANT #4
CAP. 252,000 GPD
TO BE UPGRADED

P.S. #247

P.S. #363

P.S. #314

PROPOSED CORRECTIONAL FACILITIES

PUMPING STATION (BY OTHERS)

COAST GUARD P.S.

SCSD #1 WASTEWATER TREATMENT PLANT (WILLARD)

Willard State Hospital

SENECA LAKE

TOWN OF VARICK

TOWN OF ROMULUS

Sampson State Park

Pontius Point

Airfield

1"=3000' 3000 0 3000

FILE NO. 10044.21191

SENECA ARMY DEPOT – PHASE 2

PROPOSED SANITARY FACILITIES ALTERNATIVE 1

O'BRIEN & GERE ENGINEERS INC.

PLOT DATE: 1/25/99

FIGURE 2

LEGEND

- 4"FM — EXISTING FORCE MAIN
- 8" — EXISTING GRAVITY SANITARY SEWER
- EXISTING PUMPING STATION
- EXISTING TREATMENT PLANT
- N — SEWAGE TREATMENT AT NORTH END WWTP
- S — SEWAGE TREATMENT AT SOUTH END WWTP
- W — SEWAGE TREATMENT AT WILLARD WWTP
- PROPOSED PUMPING STATION
- 6"FM — PROPOSED FORCE MAIN
- PROPOSED GRAVITY SEWER REHABILITATION
- SENECA ARMY DEPOT BOUNDARY

I:\DIV09\PROJECTS\10044.21191\DWG\PHASE2\FIG-2.DWG 1=3000

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SOUTH END WASTEWATER TREATMENT PLANT #4
CAP. 252,000 GPD
TO BE UPGRADED AND EXPANDED

4" FM WITH FLOW CONTROL VALVE TO WWTP #4

6"FM

PUMPING STATION (BY OTHERS)

S/N PROPOSED CORRECTIONAL FACILITIES

COAST GUARD P.S.

P.S. #247

P.S. #363

P.S. #314

P.S. #826

"Q" AREA

PLUG 8" SEWER

NORTH END WASTEWATER TREATMENT PLANT #715
CAP. 300,000 GPD
TO BE REACTIVATED AND UPGRADED

6" EFFLUENT MAIN
1465 FT.

SCSD #1 WASTEWATER TREATMENT PLANT (WILLARD)

TOWN OF VARICK

TOWN OF ROMULUS

SENECA LAKE

Sampson State Park

Willard State Hospital

1"=3000'

3000 0 3000

FILE NO. 10044.21191

SENECA ARMY DEPOT – PHASE 2

PROPOSED SANITARY FACILITIES ALTERNATIVE 2

O'BRIEN & GERE ENGINEERS INC.

I:\DIV09\PROJECTS\10044\21191\DWG\PHASE2\FIG-3.DWG 1=3000

FIGURE 3

LEGEND

- 4"FM — EXISTING FORCE MAIN
- 8" — EXISTING GRAVITY SANITARY SEWER
- EXISTING PUMPING STATION
- EXISTING TREATMENT PLANT
- N — SEWAGE TREATMENT AT NORTH END WWTP
- S — SEWAGE TREATMENT AT SOUTH END WWTP
- W — SEWAGE TREATMENT AT WILLARD WWTP
- PROPOSED PUMPING STATION
- 6"FM — PROPOSED FORCE MAIN
- PROPOSED GRAVITY SEWER REHABILITATION
- SENECA ARMY DEPOT BOUNDARY

SOUTH END WASTEWATER TREATMENT PLANT #4
CAP. 252,000 GPD
TO BE UPGRADED AND EXPANDED

NORTH END WASTEWATER TREATMENT PLANT #715
CAP. 300,000 GPD
TO BE ABANDONED

SCSD #1 WASTEWATER TREATMENT PLANT (WILLARD)
TO BE EXPANDED

PROPOSED CORRECTIONAL FACILITIES

COAST GUARD P.S.

PUMPING STATION (BY OTHERS)

P.S. #247

P.S. #363

P.S. #314

P.S. #826

"Q" AREA

PLUG 8" SEWER

OVID FLOW METER MANHOLE POINT B

POINT A (REFER TO SECTION 4.3.1.)

POINT C

OVID TRUNK SEWER

SENECA LAKE

TOWN OF VARICK

TOWN OF ROMULUS

SENECA ARMY DEPOT – PHASE 2

PROPOSED SANITARY FACILITIES ALTERNATIVE 3

1"=3000' 3000 0 3000

FILE NO. 10044.21191

O'BRIEN&GERE ENGINEERS INC.

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I:\DIV09\PROJECTS\10044\21191\DWG\PHASE2\FIG-4.DWG 1=3000

FIGURE 4

LEGEND

- 4"FM — EXISTING FORCE MAIN
- 8" — EXISTING GRAVITY SANITARY SEWER
- EXISTING PUMPING STATION
- EXISTING TREATMENT PLANT
- N — SEWAGE TREATMENT AT NORTH END WWTP
- S — SEWAGE TREATMENT AT SOUTH END WWTP
- W — SEWAGE TREATMENT AT WILLARD WWTP
- PROPOSED PUMPING STATION
- 6"FM — PROPOSED FORCE MAIN
- PROPOSED GRAVITY SEWER REHABILITATION
- SENECA ARMY DEPOT BOUNDARY

SOUTH END WASTEWATER TREATMENT PLANT #4
CAP. 252,000 GPD
TO BE ABANDONED

PLUG 10" SEWER

PLUG 8" SEWER

NORTH END WASTEWATER TREATMENT PLANT #715
CAP. 300,000 GPD
TO BE REACTIVATED, UPGRADED AND EXPANDED

6" EFFLUENT MAIN
1465 FT.

PROPOSED CORRECTIONAL FACILITIES

PUMPING STATION (BY OTHERS)

COAST GUARD P.S.

P.S. #247

P.S. #363

P.S. #314

P.S. #826

"Q" AREA

SCSD #1 WASTEWATER TREATMENT PLANT (WILLARD)

SENECA LAKE

TOWN OF VARICK

TOWN OF ROMULUS

1"=3000' 3000 0 3000

FILE NO. 10044.21191

SENECA ARMY DEPOT – PHASE 2

PROPOSED SANITARY FACILITIES ALTERNATIVE 4

O'BRIEN & GERE ENGINEERS INC.

PLOT DATE: 1/25/99

I:\DIV09\PROJECTS\10044\21191\DWG\PHASE2\FIG-5.DWG 1=3000

FIGURE 5

LEGEND

- 4"FM — EXISTING FORCE MAIN
- 8" — EXISTING GRAVITY SANITARY SEWER
- EXISTING PUMPING STATION
- EXISTING TREATMENT PLANT
- N — SEWAGE TREATMENT AT NORTH END WWTP
- S — SEWAGE TREATMENT AT SOUTH END WWTP
- W — SEWAGE TREATMENT AT WILLARD WWTP
- PROPOSED PUMPING STATION
- 6"FM — PROPOSED FORCE MAIN
- PROPOSED GRAVITY SEWER REHABILITATION
- SENECA ARMY DEPOT BOUNDARY

SOUTH END WASTEWATER TREATMENT PLANT #4
CAP. 252,000 GPD
TO BE UPGRADED AND EXPANDED

NORTH END WASTEWATER TREATMENT PLANT #715
CAP. 300,000 GPD
TO BE ABANDONED

PROPOSED CORRECTIONAL FACILITIES

COAST GUARD P.S.

PUMPING STATION (BY OTHERS)

P.S. #247

P.S. #363

P.S. #314

P.S. #826

"Q" AREA

PLUG 8" SEWER

SCSD #1 WASTEWATER TREATMENT PLANT (WILLARD)

SENECA LAKE

TOWN OF VARICK

TOWN OF ROMULUS

SENECA ARMY DEPOT – PHASE 2

PROPOSED SANITARY FACILITIES ALTERNATIVE 5

1"=3000' (3000 0 3000)

FILE NO. 10044.21191

O'BRIEN & GERE ENGINEERS INC.

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I:\DIV09\PROJECTS\10044\21191\DWG\PHASE2\FIG-6.DWG 1=3000

FIGURE 6

LEGEND

- 4"FM — EXISTING FORCE MAIN
- 8" — EXISTING GRAVITY SANITARY SEWER
- EXISTING PUMPING STATION
- EXISTING TREATMENT PLANT
- N — SEWAGE TREATMENT AT NORTH END WWTP
- S — SEWAGE TREATMENT AT SOUTH END WWTP
- W — SEWAGE TREATMENT AT WILLARD WWTP
- PROPOSED PUMPING STATION
- 6"FM — PROPOSED FORCE MAIN
- PROPOSED GRAVITY SEWER REHABILITATION
- SENECA ARMY DEPOT BOUNDARY

SOUTH END WASTEWATER TREATMENT PLANT #4
CAP. 252,000 GPD
TO BE UPGRADED AND EXPANDED

NORTH END WASTEWATER TREATMENT PLANT #715
CAP. 300,000 GPD
TO BE ABANDONED

PROPOSED CORRECTIONAL FACILITIES

PUMPING STATION (BY OTHERS)

COAST GUARD P.S.

P.S. #247

P.S. #363

P.S. #314

P.S. #826

"Q" AREA

PLUG 8" SEWER

PLUG 10" SEWER

SCSD #1 WASTEWATER TREATMENT PLANT (WILLARD)

Willard State Hospital

TOWN OF VARICK

TOWN OF ROMULUS

SENECA LAKE

Sampson State Park

Pontius Point

SENECA ARMY DEPOT – PHASE 2

PROPOSED SANITARY FACILITIES ALTERNATIVE 6

1"=3000' 3000 0 3000

FILE NO. 10044.21191

O'BRIEN&GERE ENGINEERS INC.

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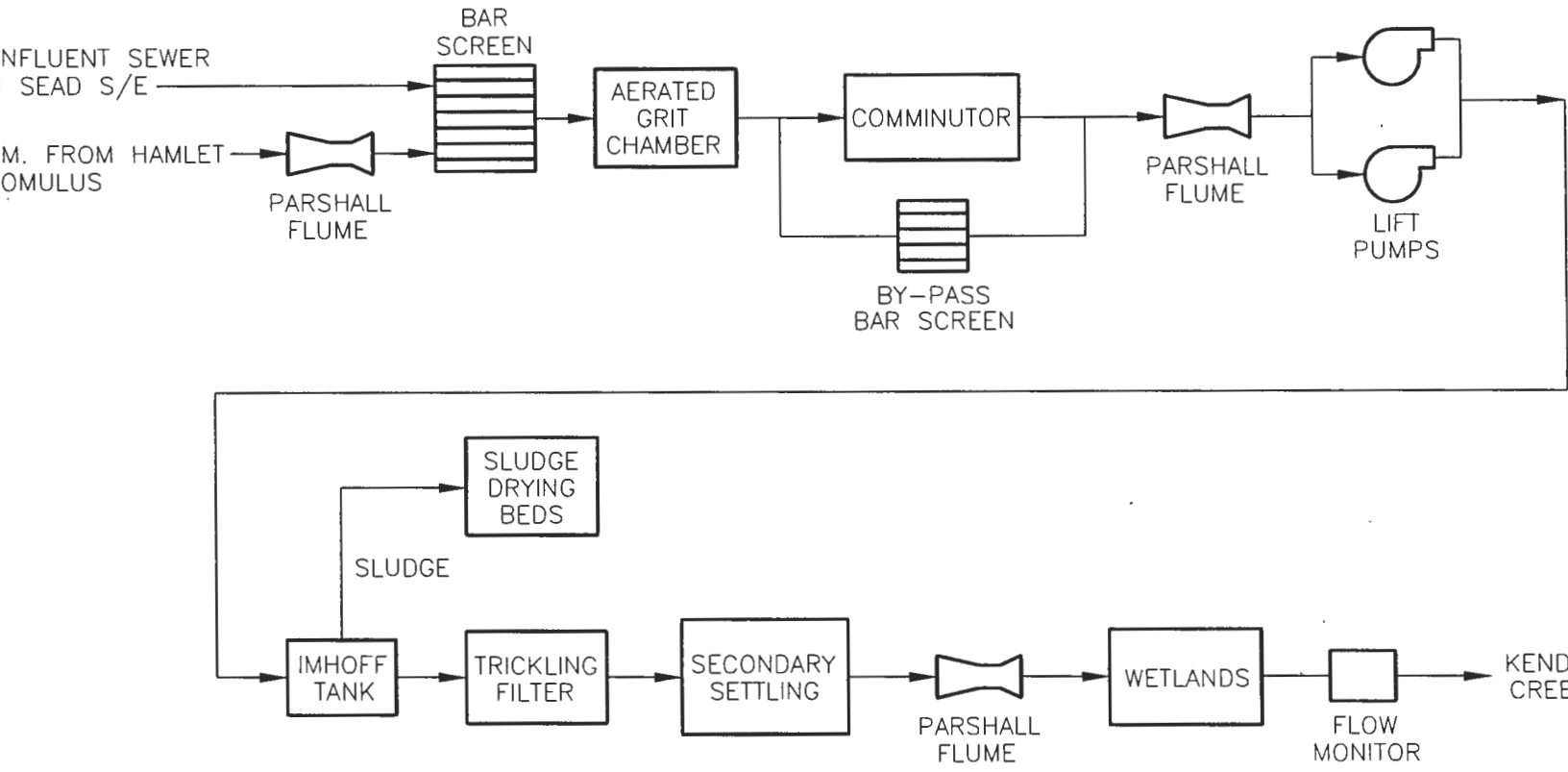
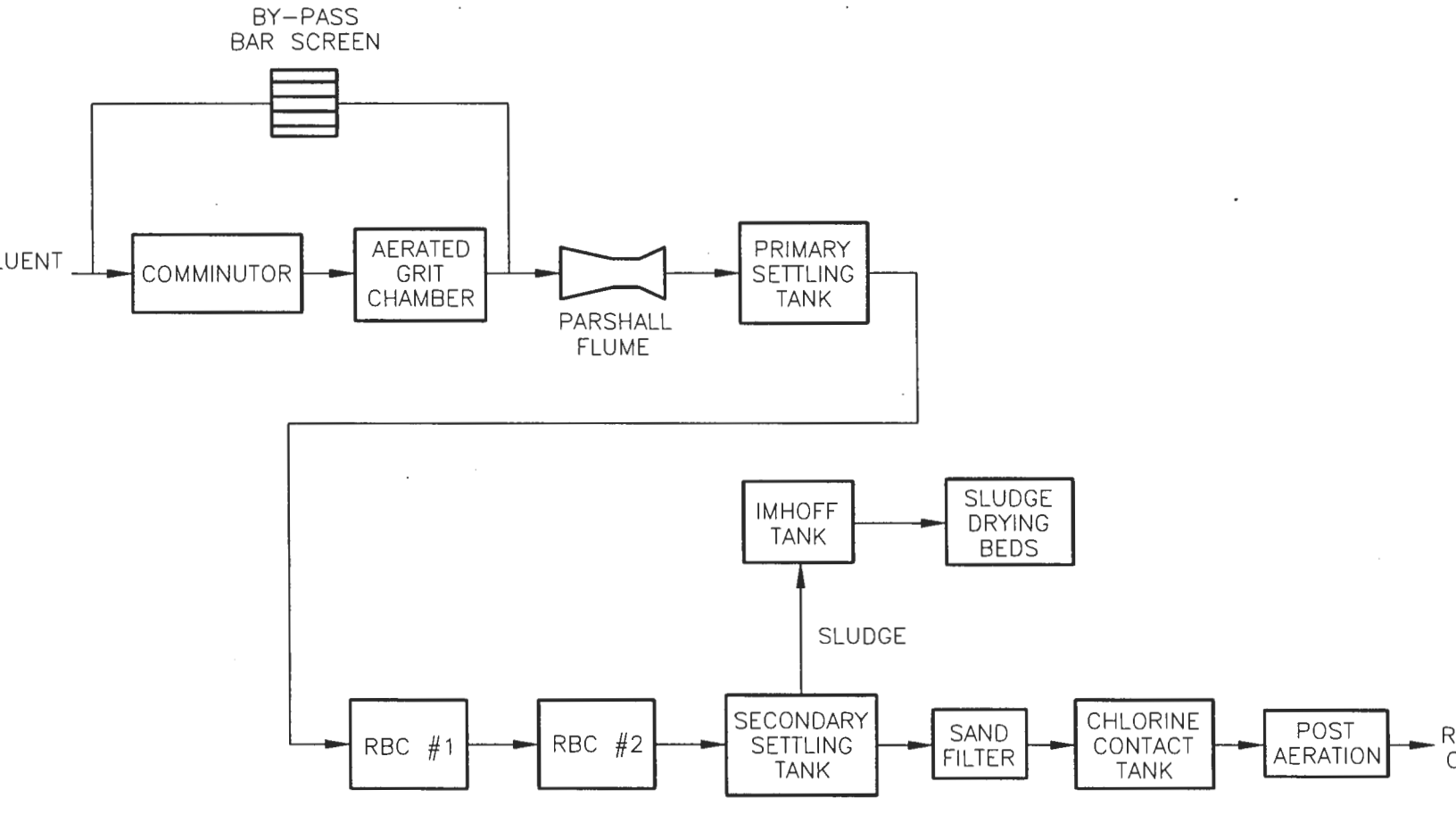
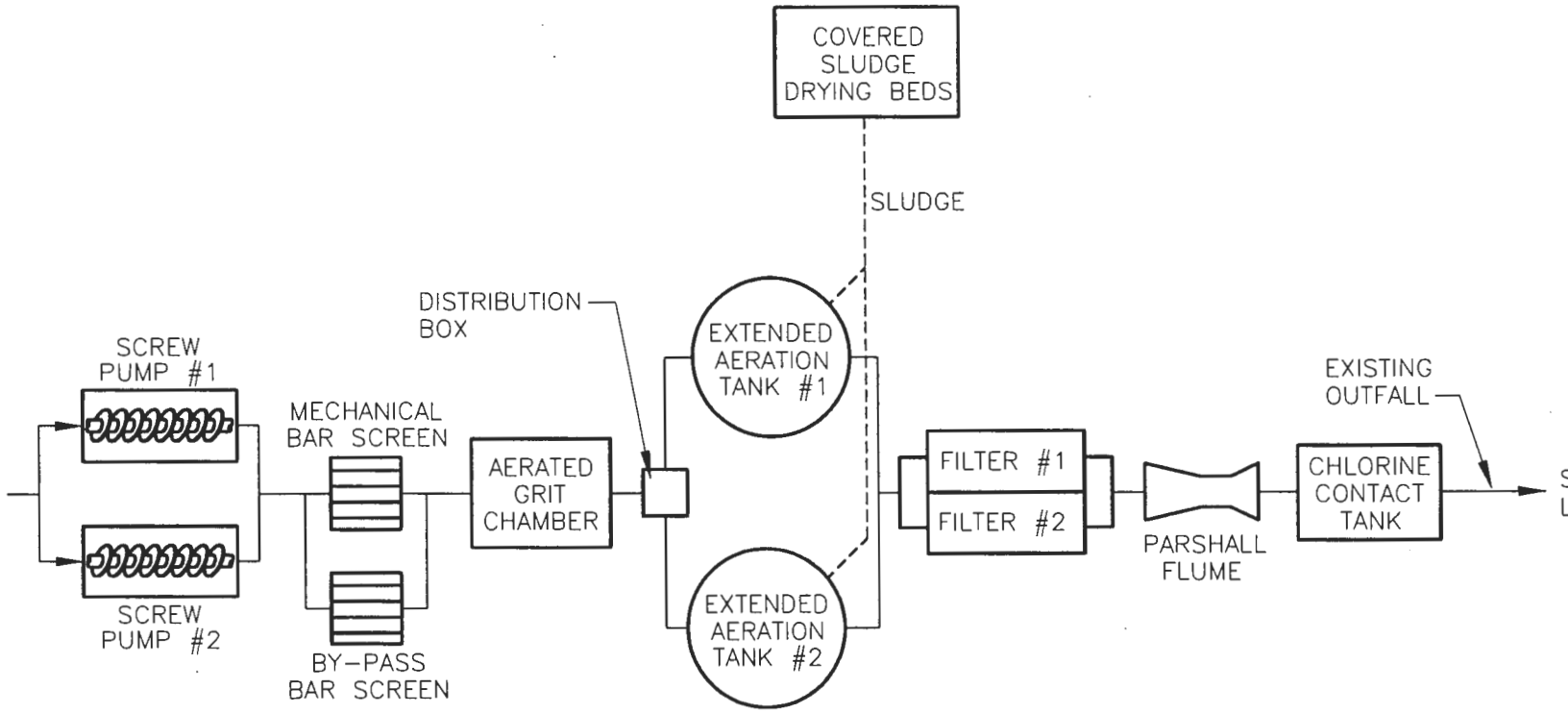


EXISTING PROCESS FLOW DIAGRAM – SEAD S/E WWTP #4



EXISTING PROCESS FLOW DIAGRAM – SEAD N/E WWTP #715



EXISTING PROCESS FLOW DIAGRAM – SCSD-1 WWTP AT WILLARD

Figure 10: SCSD-1 WWTP at Willard

Avg. Daily Flow (MGD): Avg. By Month

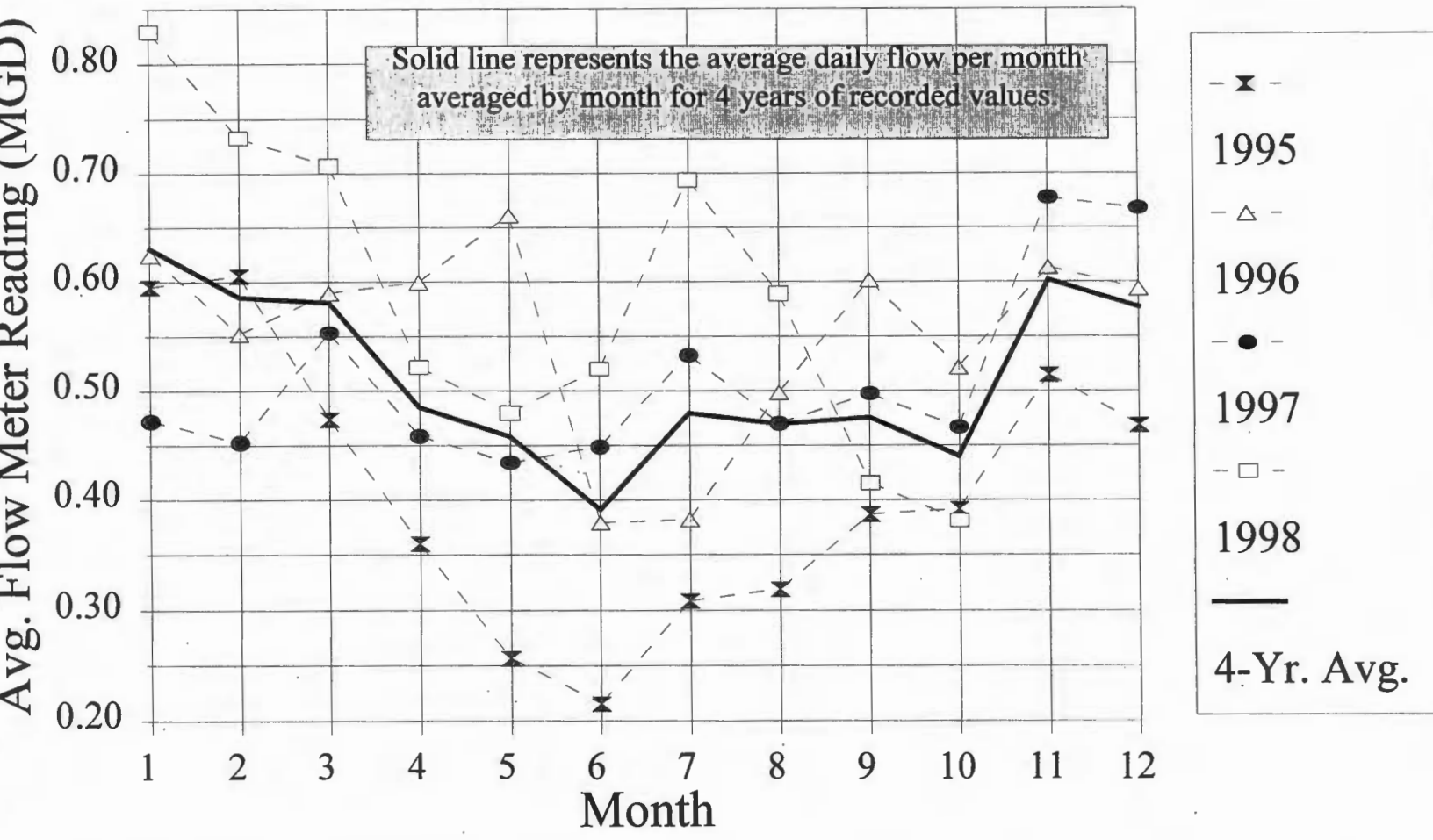


Figure 11: SCSD-1 WWTP at Willard

Avg. Daily Flow (MGD) on Monthly Basis