

# 1991 G. O. BOND ISSUE BRANCH CREEK SANITARY SEWER COLLECTOR LINE

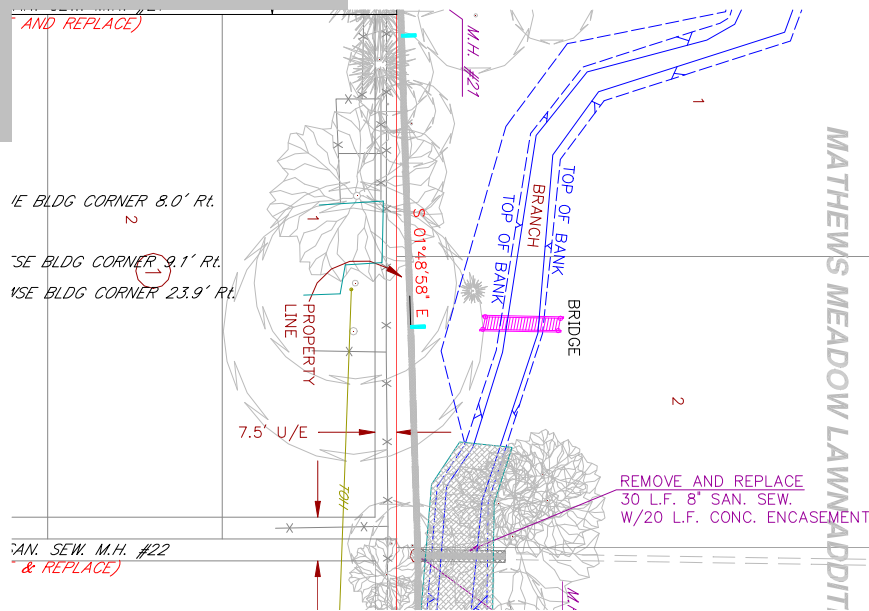
## HIGHLIGHTS:

- **Client: City of Del City, OK**  
Public Works Director  
4517 S. E. 29th Street  
Del City, Oklahoma 73115  
(405) 671-2800
- **Project Year: 1998**
- **Project Cost:  
\$500,000.00**

As City Engineer, members of our staff were totally responsible for replacement of the Branch Creek Collector Line including investigation and development, design, bidding, funding, inspection and contract administration.

Upon determination of the scope of the problem, our staff prepared a cost analysis to determine the type of rehabilitation to be utilized. Open cut and trenchless methods of repair were compared.

Both topographical and television surveys were conducted and construction plans and specifications were prepared for



- Approximately 2,500 L.F. of 8" sanitary sewer line
- Approximately 2,000 L.F. of 12" sanitary sewer line
- Approximately 500 L.F. of 6" sanitary sewer force main

MATHEWS MEADOW LAWNADDIT.

# 1991 G. O. BOND ISSUE CHERRY CREEK SANITARY SEWER INTERCEPTOR IMPROVEMENTS

## HIGHLIGHTS:

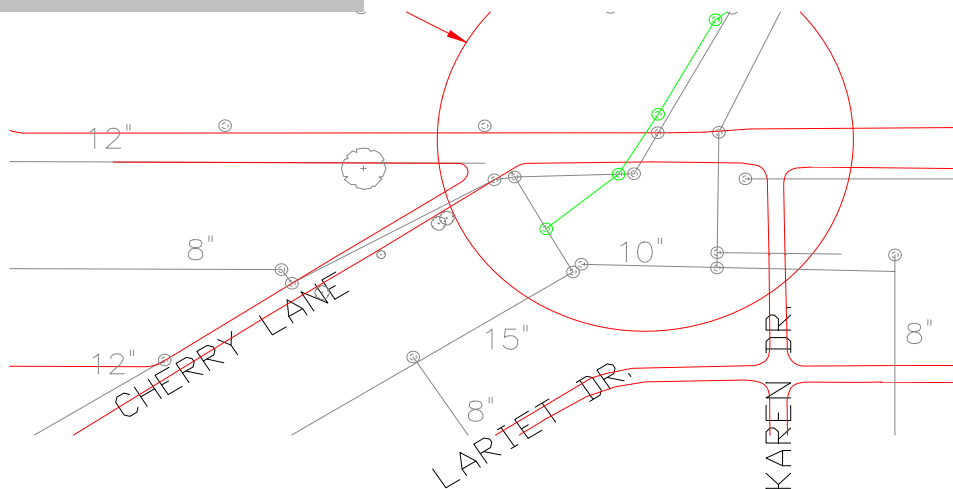
- **Client: City of Del City, OK**  
Public Works Director  
4517 S. E. 29th Street  
Del City, Oklahoma 73115  
(405) 671-2800
- **Project Year: 1998**
- **Project Cost: \$77,943.00**

As City Engineer, members of our staff were totally responsible for rehabilitation of the Cherry Creek Interceptor Line including investigation and development, design, bidding, funding, inspection and contract administration.

Upon determination of the scope of the problem, our staff prepared a cost analysis to determine the type of rehabilitation to be utilized. Open cut and trenchless methods of repair were compared.

Both topographical and television surveys were conducted and construction plans and specifications were prepared for

- Approximately 143 L.F. of 15" sanitary sewer line
- Approximately 288 L.F. of 18" sanitary sewer line



# 1991 G. O. BOND ISSUE WASTEWATER TREATMENT FACILITY IMPROVEMENTS

## HIGHLIGHTS:

- **Client: City of Del City, OK**

Public Works Director  
4517 S. E. 29th Street  
Del City, Oklahoma 73115  
(405) 671-2800

- **Project Year: 1996**

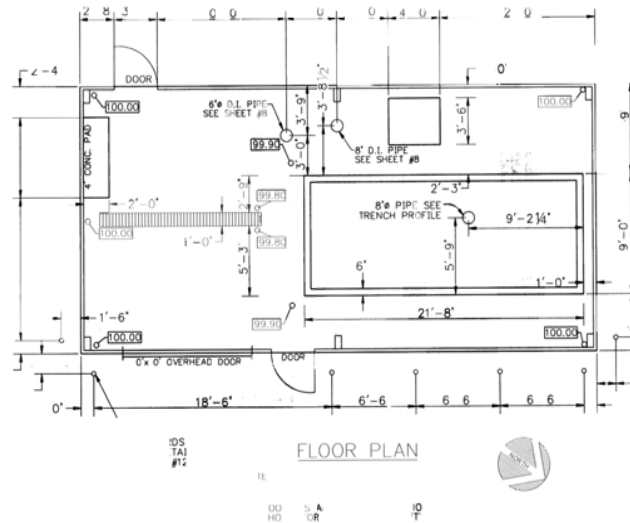
- **Project Cost:  
\$302,750.00**

As City Engineer, members of our staff were totally responsible for the renovations to the Del City Wastewater Treatment Facility including investigation and development, design, bidding, funding, inspection and contract administration.

Rehabilitation plans and specifications were prepared for:

- concrete building foundation, equipment pads and metal building components including all related electrical, mechanical and plumbing accessories
- replacement sludge pumps, necessary piping, mechanical and electrical components
- gravity belt thickener

Members of our staff provided experienced construction administration including amendments and change orders. Upon completion of the project, as-built plans were prepared and provided to the City.



# PROCESS EVALUATION WASTEWATER TREATMENT PLANT

## HIGHLIGHTS:

- **Client: City of Del City, OK**  
Public Works Director  
4517 S. E. 29th Street  
Del City, Oklahoma 73115  
(405) 671-2800
- **Project Year: 1994**

A "Process Evaluation" of the Del City wastewater treatment plant was conducted to assist in implementing improvements to the Wastewater Treatment Plant.

Plant data from January 1993 through October 1994 was used in the process evaluation.

This data consisted of influent and effluent flows, BODs, TSS and NH<sub>3</sub>-N; including plant operating data such as MLTSS, sludge ages, F:M ratios and SVIs, and sludge land application data.

SBR OPERATING MODEL	
DEL CITY WASTEWATER TREATMENT PLANT	
<b>INPUT PARAMETERS</b>	<b>BIOKINETIC CONSTANTS</b>
F = 3.0 MGD	U <sub>max</sub> = 5.0 lbs/day/lb
Inf BOD = 190 mg/l	K <sub>b</sub> = 5.4 lbs/day/lb
Inf TSS = 190 mg/l	U <sub>max'</sub> = 3.0 lbs/day/lb
Si = 76 mg/l	K <sub>H</sub> = 3.5 lbs/day/lb
St = 3 mg/l	
So = 1 mg/l	<b>SBR PARAMETERS</b>
No = 12 mg/l	Settle Time = 120 minutes
Vo = 1.125 MG	Decant = 48 minutes
Yo = 0.4 lb/lb	
<b>CALCULATED PARAMETERS</b>	
Tf = 3.0 hours	F:M = 0.06 1/days
Vt = 1,500 MG	
Sa = 19.7 mg/l	
Ta = 0.2 hours	
<b>REQUIRED BIOMASS</b>	
BIOMASS = $\frac{Sa}{[Um Sa/(Sa-St) - kb]Tf}$ = 320 mg/l	
<b>SOLUBLE BOD OF DECANT</b>	
Se = $\frac{St}{Kb' + SvXTa}$ = 0.5 mg/l	
<b>AMMONIA NITROGEN CONCENTRATION OF DECANT</b>	
Ne = $\frac{No - Yo(Si - Se)0.124}{F}$ = 1.8 mg/l	
Nitrification Rate (lbs/day/lb) = 0.2	
Rate @ 55 F = 0.2	
Temp. F = 55	
Operating Rate = 0.202	
f = 0.2	

SBR MODEL	
DEL CITY WASTEWATER TREATMENT PLANT	
<b>AERATION REQUIREMENTS</b>	
Oxygen Required = $F(Si-Se)8.34 - [1.42Yo'F(Si-Se)8.34 + 4.3'(No-Ne)'F]8.34$	
= 0.68	
= 3,520 lbs/day	
Air Required = $\frac{\text{lbs O}_2 \text{ per day}}{0.075 \times 0.232 \times 1440 \times E}$ = 1,003 SCFM	
<b>SLUDGE PRODUCTION</b>	
Sludge from Influent TSS = 634 lbs/cycle	
Sludge Produced By Growth = 101 lbs/cycle	
Total Sludge Produced = 735 lbs/cycle	
Percent Biomass = 13.7%	
<b>SLUDGE WASTAGE</b>	
Percent Solids = 0.8%	
Wastage for Steady State = 1,511 gal/cycle	
Measured Solids = 2,500 mg/l	
Wastage for Targeted X = 4,228 gal/cycle	
Total Wastage = 5,738 gal/cycle	
Desired MLTSS(mg/l) = 2,336	
Biomass Solids(mg/l) = 343	

# 2007 SANITARY SEWER REHABILITATION

---

## HIGHLIGHTS:

- **Client: City of Midwest City, OK**

**Mr. Guy Henson,  
Community Development Director  
100 N. Midwest Blvd.  
Midwest City, OK 73110  
(405) 732-2281**

- **Project Year: 2007**
- **Project Cost:  
\$314,212.00**

As Consulting Engineer, members of our staff were totally responsible for the rehabilitation of the deteriorated sanitary sewer lines including investigation and development, design, bidding and contract administration.

Upon determination of the scope of the problem, members of our staff prepared a cost analysis to determine the type of rehabilitation to be utilized. Different types of equipment and methods of repair were compared.

Site investigation was conducted and rehabilitation plans and specifications were prepared for:

- 4,478 L.F. of 8" pipe bursting
  - 179 V.F. Manhole Rehabilitation (4' Dia.)
  - 2 EA. Sanitary Sewer Manhole (4' Dia.)
  - 4,478 L.F. Television Inspection (CCTV), Pre & Post Construction
  - 118 EA. Sewer Service Connection
  - 1,200 L.F. Sewer Service Line



Members of our staff provided experienced construction administration including amendments and change orders. Upon completion of the project, as-built plans were prepared and provided to the City.

---

# SANITARY SEWER AND STORM SEWER FOR DOWNTOWN REDEVELOPMENT

## HIGHLIGHTS:

- Client: City of Midwest City, OK

Mr. Guy Henson,  
Community Development Director  
100 N. Midwest Blvd.  
Midwest City, OK 73140-1570  
(405) 732-2281

- Project Year: 2003
- Project Cost: \$1,523,990.63

As Consulting Engineer, members of our staff were totally responsible for the rehabilitation of the deteriorated sanitary sewer lines including investigation and development, design, bidding and contract administration.

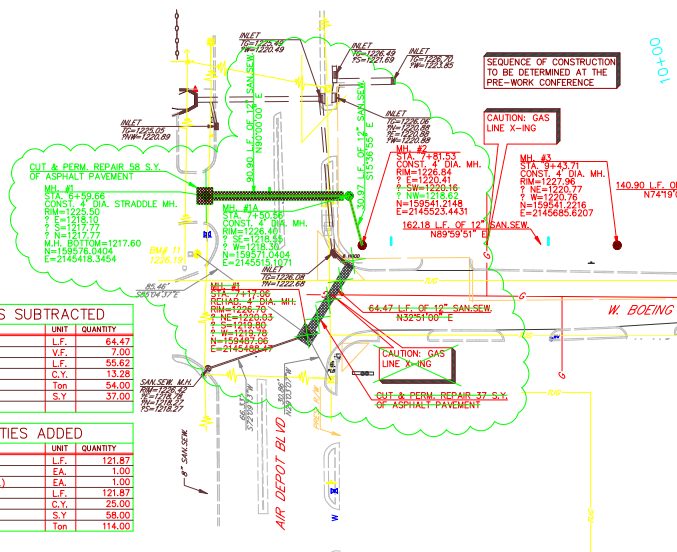
Upon determination of the scope of the problem, members of our staff prepared a cost analysis to determine the type of rehabilitation to be utilized. Different types of equipment and methods of repair were compared.

Site investigation was conducted and rehabilitation plans and specifications were prepared for:

- 4,367 L.F. of 12" sanitary sewer pipe
  - 1,617 L.F. 8'x5' RCB
  - 499 L.F. 8'x4' RCB
  - 353 L.F. 7'x4' RCB
  - 317 L.F. 6'x4' RCB
  - 582 L.F. 5'x5' RCB
  - 444 L.F. 5'x4' RCB
  - 612 L.F. 4'x4' RCB

FIELD CHANGE QUANTITIES SUBTRACTED			
ITEM NO.	ITEM	UNIT	QUANTITY
1	12" Sanitary Sewer Line	L.F.	64.47
2	Sanitary Sewer Manhole Rehab. (4' Dia.)	V.F.	7.00
3	Sanitary Sewer Trenching (6"-10")	L.F.	59.62
4	Embedment Material	C.Y.	13.28
5	Crusher Run Backfill	Ton	54.00
6	Cut & Perm. Repair (Asphalt Paving)	S.Y.	37.00

FIELD CHANGE QUANTITIES ADDED			
ITEM NO.	ITEM	UNIT	QUANTITY
1	12" Sanitary Sewer Line	L.F.	121.87
2	Sanitary Sewer Manhole (4' Dia.)	EA.	1.00
3	Sanitary Sewer Straddle Manhole (4' Dia.)	EA.	1.00
4	Sanitary Sewer Trenching (8"-10")	L.F.	121.87
5	Embedment Material	C.Y.	25.00
6	Cut & Perm. Repair (Asphalt Paving)	S.Y.	58.00
7	Crusher Run Backfill	Ton	114.00



Members of our staff provided experienced construction administration including amendments and change orders. Upon completion of the project, as-built plans were prepared and provided to the City.

# 2005-2006 G. O. BOND ISSUES SANITARY SEWER REHABILITATION

---

## HIGHLIGHTS:

- **Client: City of Nichols Hills, OK**

**Mr. David Poole, City Manager**  
6407 Avondale Drive  
Nichols Hills, OK 73116  
Tel.: 405/843-6637

- **Project Year: 2006-2007**
- **Project Cost: \$462,974.00**

As City Engineer, members of our staff were totally responsible for the rehabilitation of deteriorated sanitary sewer line including investigation and development, design, bidding, funding, inspection and contract administration.

Upon determination of the scope of the problem, members of our staff prepared a cost analysis to determine the type of rehabilitation to be utilized. Open cut and trenchless methods of repair were compared.

Both topographical and television surveys were conducted and rehabilitation plans and specifications were prepared for:

- 4,684 L.F. of pipe bursting (8" HDPE)
- 130 V.F. of manhole rehabilitation

Members of our staff provided experienced construction administration including amendments and change orders. Upon completion of the project, as-built plans were prepared and provided to the City.



# SC-0001 1996 & 1998 G. O. BOND ISSUES CITY-WIDE SANITARY SEWER TV, CLEANING AND POINT REPAIR

---

## HIGHLIGHTS:

- **Client: City of Nichols Hills, OK**

Mr. David Poole, City Manager  
6407 Avondale Drive  
Nichols Hills, OK 73116  
Tel.: 405/843-6637

- **Project Year: 2001**
- **Project Cost: \$233,275.90**

As City Engineer, members of our staff were totally responsible for the rehabilitation of deteriorated sanitary sewer lines including investigation and development, design, bidding, funding, inspection and contract administration.

Upon determination of the scope of the project, members of our staff prepared a cost analysis to determine the type of rehabilitation to be utilized. Open cut and trenchless methods of repair were compared.

Both topographical and television surveys were conducted and rehabilitation plans and specifications were prepared for:

- 31,500 L.F. of cleaning and TV of sanitary sewer line
  - 30 V.F. of manhole repairs
  - 30 EA. point repairs
  - 1,229 L.F. pipe bursting



Members of our staff provided experienced construction administration including amendments and change orders. Upon completion of the project, as-built plans were prepared and provided to the City.

---

# SC-9801 1998 G. O. BOND ISSUE SANITARY SEWER REHABILITATION PHASE II

---

## HIGHLIGHTS:

- **Client: City of Nichols Hills, OK**

Mr. David Poole, City Manager  
6407 Avondale Drive  
Nichols Hills, OK 73116  
Tel.: 405/843-6637

- **Project Year: 1999**
- **Project Cost: \$491,049.34**

As City Engineer, members of our staff were totally responsible for the rehabilitation of deteriorated sanitary sewer line including investigation and development, design, bidding, funding, inspection and contract administration.

Upon determination of the scope of the problem, members of our staff prepared a cost analysis to determine the type of rehabilitation to be utilized. We compared open cut and trenchless methods of repair.

Both topographical and television surveys were conducted and rehabilitation plans and specifications were prepared for:

- 5,748 L.F. of 8" trenchless sanitary sewer pipe



Members of our staff provided experienced construction administration including amendments and change orders. Upon completion of the project, as-built plans were prepared and provided to the City.

---

# SC-0493 SANITARY SEWER RELOCATION @ I-35 AND I-40 INTERCHANGES PHASES I & II

---

## HIGHLIGHTS:

- **Client: Oklahoma City Water Utilities Trust (OCWUT)**

Ms. Marsha Slaughter, P.E.  
420 W. Main - 7<sup>th</sup> Fl.  
OKC, OK 73102  
Tel.: (405) 297-2033

- **Project Year: 1998**
- **Project Cost: \$1,645,029.00**

Members of our staff were totally responsible for design including investigation and development, bidding and contract administration for relocation of a sanitary sewer outfall line to serve downtown Oklahoma City and to make way for the newly constructed I-35/I-40 Interchange.

Topographical survey was conducted and construction plans and specifications were prepared for:

- Approximately 520 L.F. of 8" sanitary sewer line
- Approximately 1,653 L.F. of 12" sanitary sewer line
- Approximately 1,670 L.F. of 18" sanitary sewer line
- Approximately 4,450 L.F. of 24" sanitary sewer line
- Approximately 372 L.F. of 30" sanitary sewer line



Members of our staff provided experienced construction administration including amendments and change orders. Because this construction/relocation was an Oklahoma City/Oklahoma Department of Transportation project, final quantities were separated to justify all expenditures. Upon completion of the project,

as-built plans were prepared and provided to the City.

---

# SC-0609 DEEP FORK SANITARY SEWER REHABILITATION AND RELIEF LINE

---

## HIGHLIGHTS:

- **Client: Oklahoma City Water Utilities Trust (OCWUT)**

Ms. Marsha Slaughter, P.E.  
420 W. Main - 7<sup>th</sup> Fl.  
OKC, OK 73102  
Tel.: (405) 297-2033

- **Project Year: 2002-2003**
- **Project Cost: \$3,897,000.00**

Members of our staff were totally responsible for design including survey, investigation and development, bidding and contract administration for the study, design and construction of a sanitary sewer line rehabilitation in the vicinity of the Deep Fork area of Oklahoma City from N. Pennsylvania Avenue to N. Portland Avenue and N. W. 41st Street to N. W. 30th Street.

Topographical survey was conducted and construction plans and specifications were prepared for bidding the project in two separate phases. The project phasing is due, in part, to the different types of rehabilitation: 7,050 L. F. trenchless-in-place construction and 9,400 L.F. new-alignment construction. Additionally, the project phasing was suggested to keep estimated construction costs within a reasonable limit to allow local contractors the ability to bid these projects.



Members of our staff provided experienced construction administration including amendments and change orders. Upon completion of the project, as-built plans were prepared and provided to the City.

# SC-0640 SANITARY SEWER RELIEF LINE EXPANSION

---

## HIGHLIGHTS:

- **Client: Oklahoma City Water Utilities Trust (OCWUT)**

Ms. Marsha Slaughter, P.E.  
420 W. Main - 7<sup>th</sup> Fl.  
OKC, OK 73102  
Tel.: (405) 297-2033

- **Project Year: 2008**
- **Project Cost: \$4,300,000.00**

Members of our staff were totally responsible for design including survey, investigation and development, bidding and contract administration for the study, design and construction of a sanitary sewer line expansion in the vicinity of S. E. 29th Street from Douglas Boulevard to Sooner Road.

A preliminary engineering and alignment report were provided for the proposed improvements. Coordination with Tinker Air Force Base was required since the project improvements impact the air force base.

Topographical survey was conducted and construction plans and specifications were prepared on a “fast track” basis to meet stringent time constraints.



Members of our staff provided experienced construction administration including amendments and change orders. Upon completion of the project, as-built plans were prepared and provided to the City.

---

# SC-0686 CLEAN, CCTV & REPAIR SOUTH CANADIAN INTERCEPTOR

---

## HIGHLIGHTS:

- **Client: Oklahoma City  
Water Utilities Trust  
(OCWUT)**

Ms. Marsha Slaughter, P.E.  
420 W. Main - 7<sup>th</sup> Fl.  
OKC, OK 73102  
Tel.: (405) 297-2033

- **Project Year: 2005**
- **Project Cost:  
\$272,024.00**

Members of our staff were totally responsible for design including survey, investigation and development, bidding and contract administration for the study, design and construction of sanitary sewer line repairs in the vicinity of S. W. 149th Street and S. Pennsylvania Avenue.

A preliminary engineering and alignment report were provided for the proposed repairs.

Topographical survey was conducted and construction plans and specifications were prepared on a “fast track” basis to meet stringent time constraints.

Members of our staff provided experienced construction administration including amendments and change orders. Upon completion of the project, as-built plans were prepared and provided to the City.



# WITCHER WASTEWATER LIFT STATION

---

## HIGHLIGHTS:

- **Client: Oklahoma City Water Utilities Trust (OCWUT)**

Ms. Marsha Slaughter, P.E.  
420 W. Main - 7<sup>th</sup> Fl.  
OKC, OK 73102  
Tel.: (405) 297-2033

- **Project Year: 1992**
- **Project Cost: \$750,000.00**

Members of our staff were totally responsible for design including investigation and development, bidding and contract administration of a sanitary sewer lift station pump to serve Oklahoma City at the existing Witcher Lift Station.

Topographical survey was conducted and construction plans and specifications were prepared for:

- 20 MGD pump with 500 hp electric motor
- Electronic drive and controls

Members of our staff provided experienced construction administration including amendments and change orders.



Upon completion of the project, as-built plans were prepared and provided to the City.

---



# US-77 SANITARY SEWER REHABILITATION / RELOCATION

---

## HIGHLIGHTS:

- **Client: City of Ponca City**

Mr. Jim Fairbanks, Jr. P.E., C.F.M.  
City Engineer  
City of Ponca City  
516 East Grand / P O. Box 1450  
Ponca City, Oklahoma 74602  
Telephone: (580) 767-0333

- **Project Year: 2005**

- **Project Cost:  
\$646,613.00**

Members of our staff were totally responsible for design including investigation and development, bidding and contract administration for relocation of a sanitary sewer line to serve downtown Ponca City and to make way for the newly constructed US-77 Interchange.

Topographical survey was conducted and construction plans and specifications were prepared for:

- 1,285 L.F. 36" Sanitary Sewer Pipe
- 681 L.F. 24" Trenchless Sanitary Sewer Pipe
- 6–6' Dia. Manholes
- 34 V.F. Additional Depth for Manholes



Members of our staff provided experienced construction administration including field inspection. Upon completion of the project, as-built plans were prepared and provided to the City.

---

# WASTEWATER COLLECTION SYSTEM IMPROVEMENTS PHASE I PROJECT 1

---

## HIGHLIGHTS:

- **Client: City of Ponca City**

Dr. Hong Fu,  
Environmental Services Director  
City of Ponca City  
516 East Grand / P O. Box 1450  
Ponca City, Oklahoma 74602  
Telephone: (580) 763-8093

- **Project Year: 2008**

- **Project Cost: 691,000.00**

Members of our staff were totally responsible for design including investigation and development, bidding and contract administration for the Phase I Project 1 of the Wastewater Collection System Rehabilitation to serve Ponca City.

Topographical survey was conducted and construction plans and specifications were prepared for:

- 23 LF 8" Trenchless Rehabilitation
- 1,600 LF 12" Trenchless Rehabilitation
- 16 EA 4' Dia. Manholes
- 52 VF Additional Depth Manholes
  - 170 LF 8" PVC Sanitary Sewer Pipe
  - 2,538 LF 12" PVC Sanitary Sewer Pipe

Members of our staff provided experienced construction administration including field inspection. Upon completion of the project, as-built plans were prepared and provided to the City.



# WASTEWATER COLLECTION SYSTEM IMPROVEMENTS PHASE I PROJECT 2

---

## HIGHLIGHTS:

- **Client: City of Ponca City**

Dr. Hong Fu,  
Environmental Services Director  
City of Ponca City  
516 East Grand / P O. Box 1450  
Ponca City, Oklahoma 74602  
Telephone: (580) 763-8093

- **Project Year: 2009**

- **Project Cost:  
\$1,433,000.00**

Members of our staff were totally responsible for design including investigation and development, bidding and contract administration for the Phase I Project 2 of the Wastewater Collection System Rehabilitation to serve Ponca City.

Topographical survey was conducted and construction plans and specifications were prepared for:

- 6,052 LF Trench Excavation
- 21 EA 5' Dia. Manholes
- 2 EA 4' Dia. Manholes
- 52 VF Additional Depth Manholes
- 20 LF 8" PVC Sanitary Sewer Pipe
  - 252 LF 12" PVC Sanitary Sewer Pipe
  - 5,895 LF 24" PVC Sanitary Sewer Pipe
  - 70 LF Roadway Bore w/33" Steel Casing

Members of our staff are providing experienced construction administration including field inspection. Upon completion of the project, as-built plans will be prepared and provided to the City.



# WASTEWATER COLLECTION SYSTEM IMPROVEMENTS PHASE I PCUA#07-01

---

## HIGHLIGHTS:

- **Client: City of Ponca City**

Dr. Hong Fu,  
Environmental Services Director  
City of Ponca City  
516 East Grand / P O. Box 1450  
Ponca City, Oklahoma 74602  
Telephone: (580) 763-8093

- **Project Year: 2007**

- **Project Cost: 117,545.50**

Members of our staff were totally responsible for design including investigation and development, bidding and contract administration for the Phase I of the Wastewater Collection System Rehabilitation to serve Ponca City.

Topographical survey was conducted and construction plans and specifications were prepared for:

- 466 LF 8" Trenchless Rehabilitation
- 235 LF 10" Trenchless Rehabilitation
- 2 EA 4' Dia. Manholes
- 20 VF Additional Depth for Manholes

Members of our staff provided experienced construction administration including field inspection. Upon completion of the project, as-built plans were prepared and provided to the City.



# TINKER AIR FORCE BASE MILITARY FAMILY HOUSING SANITARY SEWER

---

## HIGHLIGHTS:

- **Client: Tinker Air Force Base, OK**

72nd CES / COE  
Tinker Air Force Base  
TAFB, Oklahoma 73145

- **Project Year: 1997**
- **Project Cost: \$2,600,000.00**

Members of our staff were responsible for the analysis, recommendations for repairs and preparation of construction documents for approximately 28,000 linear feet of sanitary sewer lines that serve the Military Family Housing area of Tinker Air Force Base. The following tasks were completed by the Design Analysis Report:

- Field Inspections were conducted of each manhole in system.
- Closed Circuit Television (CCTV) inspections of selected portions of collection system were performed.
- A hydraulic analysis of the collection system was prepared.
- Recommendations and cost estimates were prepared for the proposed improvements.

Following approval of the Design Analysis, Construction Documents were prepared for the proposed improvements. The improvements consisted of the following:

- Rehabilitation of 78 manholes,
- 22,000 linear feet of pipe lining, and
- 2,000 linear feet of sanitary sewer construction, eliminating the need for an existing lift station.

The Construction Documents included the topographic survey, plans, specifications and bid forms in accordance with Air Force requirements. "As-Built" plans were prepared upon completion of the project.



# PROPOSED 10" SANITARY SEWER FORCE MAIN ALONG ANN ARBOR AVENUE AND N. W. 42ND STREET

---

## HIGHLIGHTS:

- **Client: City of Warr Acres, OK**

Public Works Director  
City of Warr Acres  
6045 N. W. 50<sup>th</sup> Street  
Warr Acres, Oklahoma 73122  
(405) 491-6471

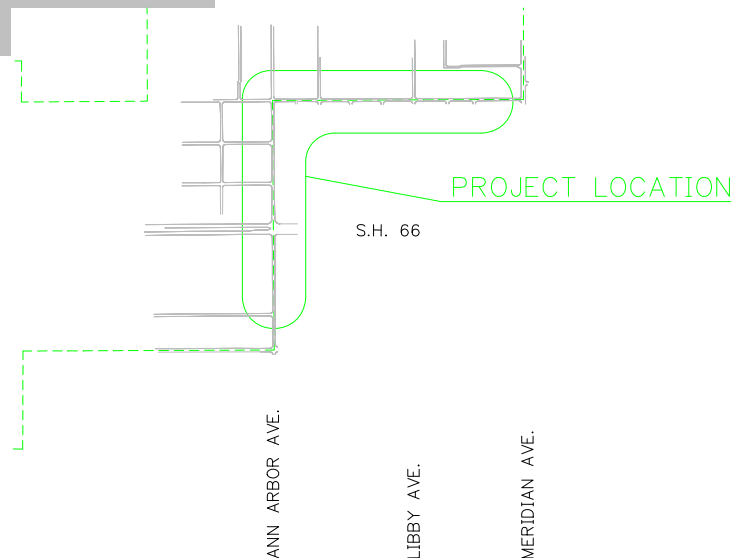
- **Project Year: 2000**
- **Project Cost: \$291,714.00**

As Consulting Engineer, members of our staff were totally responsible for the rehabilitation of deteriorated sanitary sewer line including investigation and development, design, bidding and contract administration.

Upon determination of the scope of the problem, members of our staff prepared a cost analysis to determine the type of rehabilitation to be utilized. We compared open cut and trenchless methods of repair.

Both topographical and television surveys were conducted and rehabilitation plans and specifications were prepared for:

- Approximately 4,441 linear feet of 10" Force Main



Members of our staff provided experienced construction administration including amendments and change orders. Upon completion of the project, as-built plans were prepared and provided to the City.

---

# CHEROKEE HILLS SANITARY SEWER REHABILITATION

## HIGHLIGHTS:

- **Client: City of Warr Acres, OK**

Public Works Director  
City of Warr Acres  
6045 N. W. 50<sup>th</sup> Street  
Warr Acres, Oklahoma 73122  
(405) 491-6471

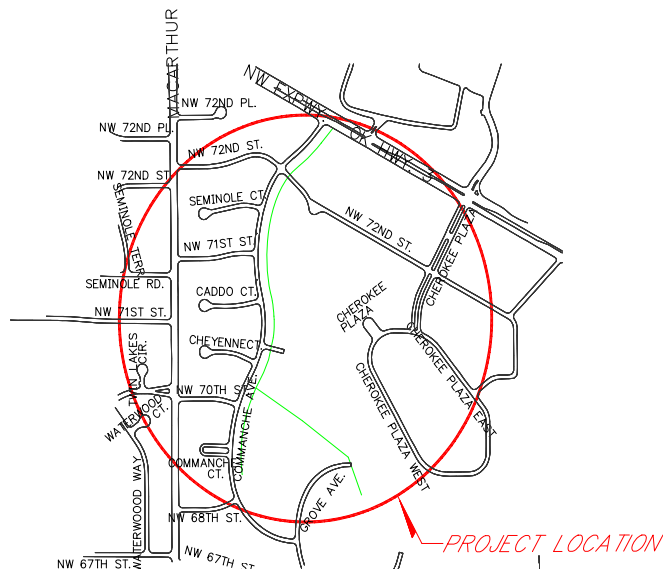
- **Project Year: 1999**
- **Project Cost: \$180,162.00**

As Consulting Engineer, members of our staff were totally responsible for the rehabilitation of deteriorated sanitary sewer line including investigation and development, design, bidding and contract administration.

Upon determination of the scope of the problem, members of our staff prepared a cost analysis to determine the type of rehabilitation to be utilized. We compared open cut and trenchless methods of repair.

Both topographical and television surveys were conducted and rehabilitation plans and specifications were prepared for:

- Approximately 141 linear feet of 12" Trenchless Sanitary Sewer Pipe
- Approximately 2,917 linear feet of 10" Trenchless Sanitary Sewer Pipe



Members of our staff provided experienced construction administration including amendments and change orders. Upon completion of the project, as-built plans were prepared and provided to the City.

# GROVE AVENUE LIFT STATION

## HIGHLIGHTS:

- **Client: City of Warr Acres, OK**

Public Works Director  
City of Warr Acres  
6045 N. W. 50<sup>th</sup> Street  
Warr Acres, Oklahoma 73122  
(405) 491-6471

- **Project Year: 1998**
- **Project Cost: \$23,050.00**

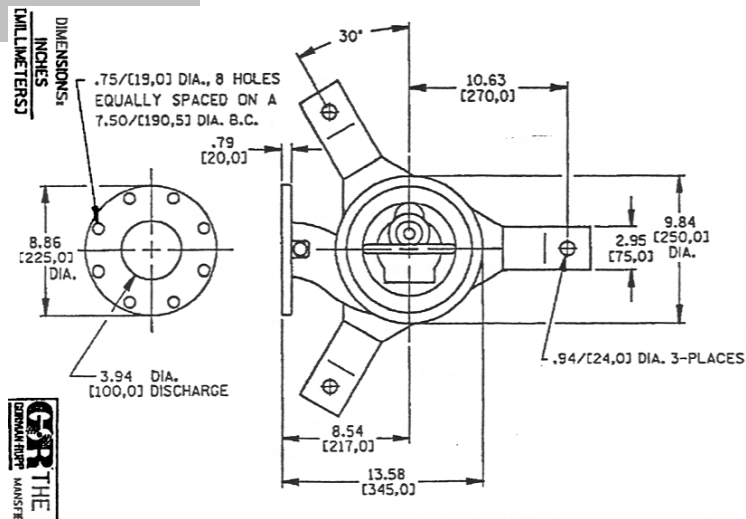
As Consulting Engineer, members of our staff were totally responsible for the rehabilitation of the deteriorated sanitary sewer lift station including investigation and development, design, bidding and contract administration.

Upon determination of the scope of the problem, members of our staff prepared a cost analysis to determine the type of rehabilitation to be utilized. We compared different types of equipment and methods of repair.

Site investigation was conducted and rehabilitation plans and specifications were prepared for:

- 2 new pumps and motors

Members of our staff provided experienced construction administration including amendments and change orders. Upon completion of the project, as-built plans were prepared and provided to the City.



# GROVE AVENUE SANITARY SEWER INTERCEPTOR REHABILITATION

---

## HIGHLIGHTS:

- **Client: City of Warr Acres, OK**

**Public Works Director  
City of Warr Acres  
6045 N. W. 50<sup>th</sup> Street  
Warr Acres, Oklahoma 73122  
(405) 491-6471**

- **Project Year: 2000**
- **Project Cost:  
\$235,416.32**

As Consulting Engineer, members of our staff were totally responsible for the rehabilitation of the deteriorated sanitary sewer lines including investigation and development, design, bidding and contract administration.

Upon determination of the scope of the problem, members of our staff prepared a cost analysis to determine the type of rehabilitation to be utilized. We compared different types of equipment and methods of repair.

Site investigation was conducted and rehabilitation plans and specifications were prepared for:

- 1,203 linear feet of 15" pipe bursting
- 1,623 linear feet of 12" pipe bursting
- 565 linear feet of 8" pipe bursting
- 85 vertical feet of manhole rehabilitation
- 2 point repairs



Members of our staff provided experienced construction administration including amendments and change orders. Upon completion of the project, as-built plans were

prepared and provided to the City.

---

# SANITARY SEWER ATLAS

## HIGHLIGHTS:

- **Client: City of Warr Acres, OK**

Public Works Director  
City of Warr Acres  
6045 N. W. 50<sup>th</sup> Street  
Warr Acres, Oklahoma 73122  
(405) 491-6471

- **Project Year: 1998**

Members of our staff were totally responsible for the research of original plats and land descriptions for the corporate limits of Warr Acres.

Work included the transfer of plat information to ACAD drawings which was pieced together to generate an overall citywide base map. Once the base map was complete, the City's sanitary sewer infrastructure was placed on the base map for field verification.

- Full Size and Half Size Color maps

Updates of the maps are supplied as requested.

