



EIR Construction Analysis

Technical Memorandum #9

Paradise Sewer Project

February 18, 2022



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Revision Log:

Revision No.	Date	Description of Changes	Author	Reviewed	Approved

1. Introduction

The Town of Paradise (Town) is implementing the Paradise Sewer Project (Project), which involves identifying and implementing a long-term solution for collection, treatment, and reuse/disposal of its wastewater. HDR is under contract to assist the Town with the first two phases of the Project—final selection of a wastewater alternative (Phase 1), and preparation of an Environmental Impact Report (EIR) covering the selected alternative (Phase 2). The results of Phase 1 were contained in six technical memoranda plus a Phase 1 Executive Summary. This technical memorandum (TM) is part of the Phase 2 effort.

The purpose of this TM 9 is to provide information and data on construction activities in support of EIR analyses.

This TM contains the following sections:

- Section 1: Introduction
- Section 2: Staging Areas
- Section 3: Construction Data
- Section 4: Proposed Temporary Road Closures
- Section 5: Project Access and Truck Routes
- Section 6: Construction Schedule
- Section 7: Proposed Work Hours

2. Staging Areas

Construction contractors need space near their active construction sites to store equipment and materials until they are needed. These locations are termed “staging areas.” As part of the EIR process, potential staging area locations are identified. Ultimately, the construction contractors selected to do the work implement their own staging areas, which may or may not include the locations identified in the EIR. If the staging areas are not covered by the EIR, the construction contractor must obtain their own environmental clearance for the sites.



For a project of this size, 40,000 square feet (e.g., 200 feet by 200 feet) has been identified as a typical size for a staging area. For the export pipeline construction, 10 potential staging area locations were identified along the export pipeline alignment, as shown in Figure 1. For construction of the collection system, which lies within Paradise, staging is assumed to take place at any of the 28 pump station locations.

3. Construction Data

For the EIR, it is necessary to quantify the construction activities. This quantification is broken out by the two major components of the Project, as follows:

- Core Collection System (which includes pipelines and pump stations)
- Export Pipeline System (which includes pipelines, five trenchless crossings, the transition chamber, and the flow control and metering structure)

The following construction quantities were estimated for each of these two components:

- Equipment types needed for construction
- Materials needed for construction
- Construction crews: size and number of crews, and equipment used by each crew
- Equipment run times
- Excavation and fill materials
- Truck trips per day
- Estimated disturbed area

These construction quantities were estimated using two Excel spreadsheets, which are on file and available for reference.

3.1 Core Collection System Construction

Equipment. The following equipment is often used on this type of collection system construction:

- Sawcutting machine
- Water truck/trailer
- Backhoe/loader (95 horsepower [hp]; e.g., a Caterpillar [Cat] 420 Backhoe Loader)
- Excavator (1.5 cubic yard [cy], 165 hp, Cat 320 Excavator)
- Tandem truck (16 cy)
- Skidsteer (80 hp)
- Excavator (2.5 cy, 310 hp, Cat 336)
- Loader (170 hp, Cat 930)
- Roller compactor (walk behind, 20 hp)
- Vibratory plate / jumping jack compactor
- Asphalt paver (75 hp)
- Roller compactor (riding, 25 ton, 170 hp)

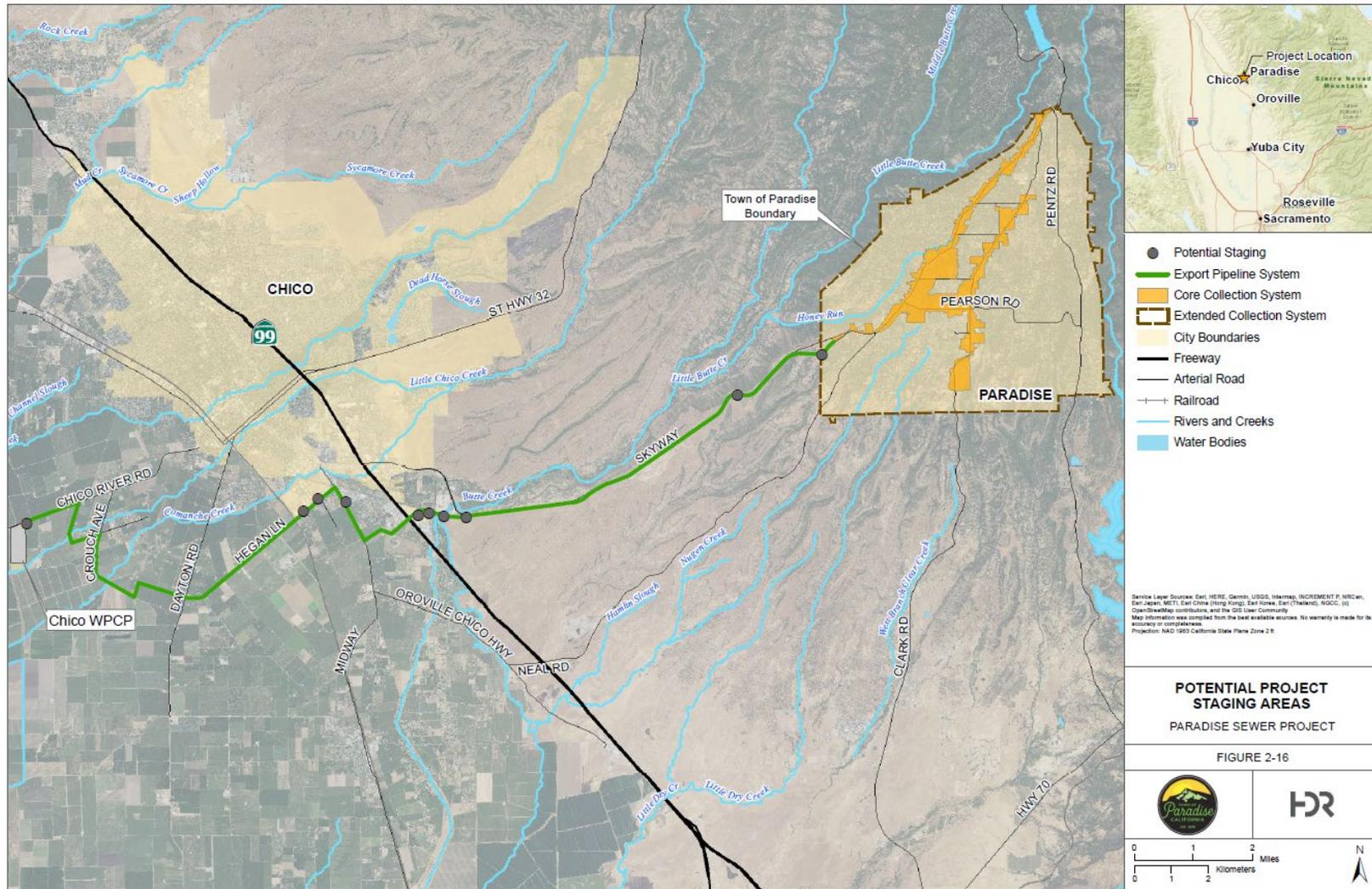


Figure 1. Locations of Potential Staging Areas



Materials. The following materials will likely be used on the collection system construction:

- PVC pipe and miscellaneous fittings
- Pre-built pump stations and associated mechanical/electrical components
- Temporary and permanent paving (asphalt)
- Backfill material

Construction Crews and Equipment. The construction crews and equipment that are estimated for the collection system construction are shown in Table 1.

Table 1. Summary of Typical Construction Crews and Equipment for Collection System

No. of Workers/Crew	Equipment
Asphalt Removal Crew	
1	Sawcutting machine
1	Water truck/trailer
1	Backhoe/loader 95 hp, Cat 420
1	Excavator 1.5 cy, 165 hp, Cat 320
2	Tandem truck 16 cy
1	Skidsteer 80 hp
7	Total per Crew
Small Diameter Pipe Installation Crew	
2	Excavator 1.5 cy, 165 hp, Cat 320
1	Loader 170 hp, Cat 930
2	Concrete truck
1	Roller compactor, walk behind, 20 hp
3	Vibratory plate / jumping jack compactor
2	Tandem truck 16 cy
11	Total per Crew
Asphalt Replacement Crew	
1	Backhoe/loader 95 hp, Cat 420
1	Loader 170 hp, Cat 930
1	Skidsteer 80 hp
1	Water truck/trailer
1	Asphalt paver 75 hp
2	Roller compactor, riding, 25T, 170 hp
2	Vibratory plate / jumping jack compactor
2	Tandem truck 16 cy
2	Striping truck
13	Total per Crew
Pump Station Installation Crew	
2	Excavator 2.5 cy, 310 hp, Cat 336
1	Loader 170 hp, Cat 930



No. of Workers/Crew	Equipment
1	Roller compactor, walk behind, 20 hp
4	Vibratory plate / jumping jack compactor
1	Tandem truck 16 cy
1	Mobile soil-cement mixer, Cemen Tech M30, 425 hp
1	Excavator 2.5 cy, 310 hp, Cat 336
1	Loader 170 hp, Cat 930, soil processor bucket
12	Total per Crew

Assuming an 18-month construction period, installation of the collection system will require multiple crews to be working at the same time. The following is the estimated number of crews working at any given time, along with the estimated duration of their actual work within the 18-month period:

- Asphalt Removal: 1 crew, 4 months
- Small Diameter Pipe Installation: 7 crews, 18 months
- Asphalt Replacement: 1 crew, 4 months
- Pump Station Installation: 2 crews, 10 months

Equipment Run Times. The total run times estimated for each piece of construction equipment on the collection system construction are shown in Table 2.

Table 2. Estimated Run Times on Collection System Construction Equipment

Equipment Description	Estimated Equipment Runtime (hrs/Day)	Duration (Days)	Total (hrs)
	Collection System		
Sawcutting machine	24	149	3,566
Water truck/trailer	206	331	68,227
Backhoe/loader 95hp, Cat 420	206	252	51,924
Excavator 1.5 cy, 165hp Cat 320	242	675	163,468
Truck tandem 16 cy	734	2,082	1,527,978
Skidsteer 80hp	206	621	128,014
Excavator 2.5 cy, 310hp Cat 336	4	81	325
Loader 170hp, Cat 930	290	703	203,762
Roller compactor, walk behind, 20hp	168	74	12,480
Vib plate/jumping jack compactor	451	764	344,590
Asphalt paver 75hp	180	683	122,914
Roller compactor, riding, 25T, 170hp	360	609	219,086
Air Compressor	208	994.4	206,835

Excavation and Fill Materials. The following excavation and fill materials are anticipated on the collection system construction:



- Soil exported: 169,400 cubic yards
- Fill material imported: 62,600 cubic yards

Truck Trips. Assuming an 18-month construction period, it is estimated that an average of 1,500 one-way truck trips (750 round trips) will be generated each working day during the collection system construction.

Estimated Disturbed Areas. Because most of the collection system construction will be installation of pipeline, the estimation of disturbed area was based on the width of excavated pipeline trench. The following summarizes that calculation:

- 186,000 feet of sewer pipeline length
- An average 2.5-foot width of excavated trench
- A disturbed area of 465,000 square feet or 10.67 acres

3.2 Export Pipeline System Construction

Equipment. The following equipment is often used on this type of export pipeline construction:

- Sawcutting machine
- Water truck/trailer
- Backhoe/loader (95 hp, Cat 420)
- Excavator (1.5 cy, 165 hp, Cat 320)
- Tandem truck (16 cy)
- Skidsteer (80 hp)
- Excavator (2.5 cy, 310 hp, Cat 336)
- Loader (170 hp, Cat 930)
- Roller compactor (walk behind, 20 hp)
- Vibratory plate / jumping jack compactor
- Asphalt paver (75 hp)
- Roller compactor (riding, 25 ton, 170 hp)
- Drilling rig (600 to 700 hp)
- Generator
- Separator
- Bentonite pumps
- Boring machine
- Air compressor

Materials. The following materials will be used on the export pipeline construction:

- PVC pipe and miscellaneous fittings
- Concrete manholes



- Precast concrete cylinders for the transition chamber and the flow control and metering structure, and associated mechanical and electrical equipment for installation at each of the two structures
- Metal carrier pipe at each of the two microtunnel trenchless crossings
- High density polyethylene (HDPE) pipe at each of the three horizontal directional drill (HDD) trenchless crossings
- Temporary and permanent paving (asphalt)
- Backfill material

Construction Crews and Equipment. The construction crews and equipment that are estimated for the export pipeline construction are shown in Table 3.

Table 3. Summary of Typical Construction Crews and Equipment for Export Pipeline

No. of Workers/Crew	Equipment
Asphalt Removal Crew	
1	Sawcutting machine
1	Water truck/trailer
1	Backhoe/loader 95 hp, Cat 420
1	Excavator 1.5 cy, 165 hp, Cat 320
2	Tandem truck 16 cy
1	Skidsteer 80 hp
7	Total per Crew
Small Diameter Pipeline Installation Crew	
2	Excavator 1.5 cy, 165 hp, Cat 320
1	Loader 170 hp, Cat 930
2	Concrete truck
1	Roller compactor, walk behind, 20 hp
3	Vibratory plate / jumping jack compactor
2	Tandem truck 16 cy
11	Total per Crew
Asphalt Replacement Crew	
1	Backhoe/loader 95 hp, Cat 420
1	Loader 170 hp, Cat 930
1	Skidsteer 80 hp
1	Water truck/trailer
1	Asphalt paver 75 hp
2	Roller compactor, riding, 25T, 170 hp
2	Vibratory plate / jumping jack compactor
2	Tandem truck 16 cy
2	Striping truck
13	Total per Crew



No. of Workers/Crew	Equipment
Structure Installation Crew	
2	Excavator 2.5 cy, 310 hp, Cat 336
1	Loader 170 hp, Cat 930
1	Roller compactor, walk behind, 20 hp
4	Vibratory plate / jumping jack compactor
1	Tandem truck 16 cy
1	Mobile soil-cement mixer, Cemen Tech M30, 425 hp
1	Excavator 2.5 cy, 310 hp, Cat 336
1	Loader 170 hp, Cat 930, soil processor bucket
12	Total per Crew
Horizontal Directional Drill (HDD) Crew	
2	Backhoe/loader 95 hp, Cat 420
1	Drilling rig 600–700 hp
1	Generator
1	Separator
2	Bentonite pumps
2	Tandem truck 16 cy
9	Total per Crew
Bore and Jack Crew	
2	Backhoe/loader 95 hp, Cat 420
1	Boring machine 600–700 hp
1	Generator
1	Separator
2	Tandem truck 16 cy
7	Total per Crew

Assuming a 12-month construction period, installation of the export pipeline will require multiple crews to be working at the same time. The following is the estimated number of crews working at any given time, along with the estimated duration of their actual work within the 12-month period:

- Asphalt Removal: 1 crew, 3 months
- Small Diameter Pipe Installation: 3 crews, 12 months
- Asphalt Replacement Crew: 1 crew, 3 months
- Structure Installation: 1 crew, 2 months
- Horizontal Directional Drilling (HDD): 1 crew, 3 months
- Bore and Jack Micro-tunneling: 1 crew, 3 months

Equipment Run Times. The total run times estimated for each piece of construction equipment on the export pipeline construction are shown in Table 4.



Table 4. Estimated Run Times on Export Pipeline Construction Equipment

Equipment Description	Estimated Equipment Runtime (hrs/Day)	Duration (Days)	Total (hrs)
	Export Pipeline		
Sawcutting machine	3	181	544
Water truck/trailer	27	284	7,526
Backhoe/loader 95hp, Cat 420	55	332	18,105
Excavator 1.5 cy, 165hp Cat 320	31	795	24,649
Truck tandem 16 cy	121	1,942	234,014
Skidsteer 80hp	27	707	18,741
Excavator 2.5 cy, 310hp Cat 336	2	70	140
Loader 170hp, Cat 930	37	737	27,277
Roller compactor, walk behind, 20hp	21	91	1,904
Vib plate/jumping jack compactor	59	317	18,699
Asphalt paver 75hp	23	287	6,456
Roller compactor, riding, 25T, 170hp	45	196	8,833
Drilling Rig 600-700hp	7	38	269
Generator	14	48	675
Separator	7	38	269
Bentonite pumps	14	38	538
Boring Machine	7	10	69
Air Compressor	40	1,111	44,448

Excavation and Fill Materials. The following excavation and fill materials are anticipated on the export pipeline construction:

- Soil exported: 60,800 cubic yards
- Fill material imported: 22,900 cubic yards

Truck Trips. Assuming a 12-month construction period, it is estimated that an average of 640 one-way truck trips (320 round trips) will be generated each working day during the export pipeline construction.

Estimated Disturbed Areas. Because most of the export pipeline construction will be installation of pipeline, the estimation of disturbed area was based on the width of excavated pipeline trench. The following summarizes that calculation:

- 96,000 feet of sewer pipeline length
- An average 2.7-foot width of excavated trench
- A disturbed area of 259,000 square feet or 5.95 acres



4. Proposed Temporary Road Closures

Where the pipeline will be installed along existing public road right-of-way, single-lane closures with traffic control around the work areas are anticipated. Full road closures are not anticipated, except perhaps for short durations while contractors move equipment, etc.

5. Project Access and Truck Routes

Project access will be via existing public roads with the exception of 9,900 feet (1.9 miles) of pipeline construction in south Chico, where the pipeline will be installed across private parcels and temporary access will be provided along and within the pipeline construction easement. The right to use the construction easement for project access and equipment routing will be obtained from the private parcel owners. Truck routes for moving equipment in and out, hauling away excess material, and importing material will follow those same routes. Figure 2 shows the proposed truck routes.

6. Construction Schedule

The estimated construction schedule for the two components—the Core Collection System and the Export Pipeline System—are shown in Figures 3 and 4.

7. Proposed Work Hours

The proposed Project is anticipated to be constructed during typical construction work hours—8 hours per day, Monday through Friday. At this time, no weekend or holiday work is planned.

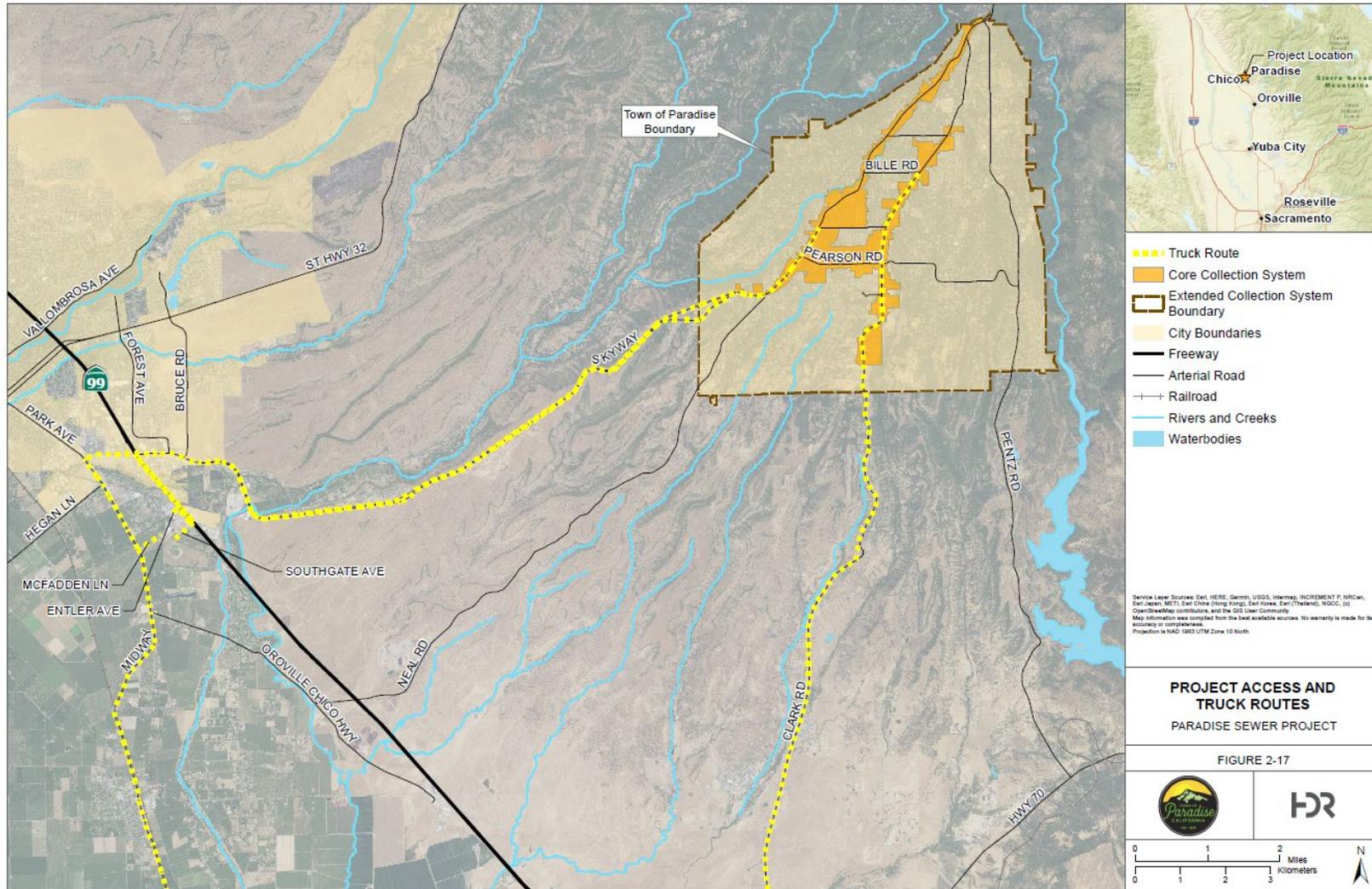


Figure 2. Project Access and Truck Routes

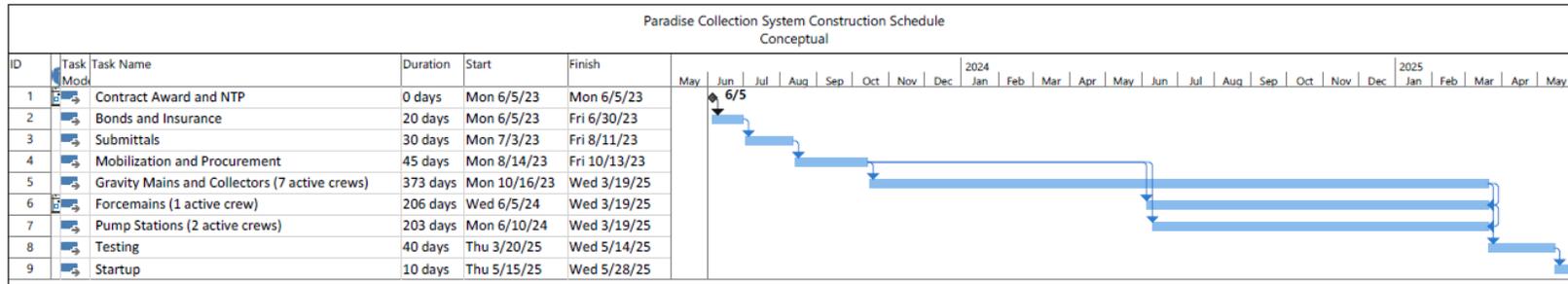


Figure 3. Estimated Collection System Construction Schedule

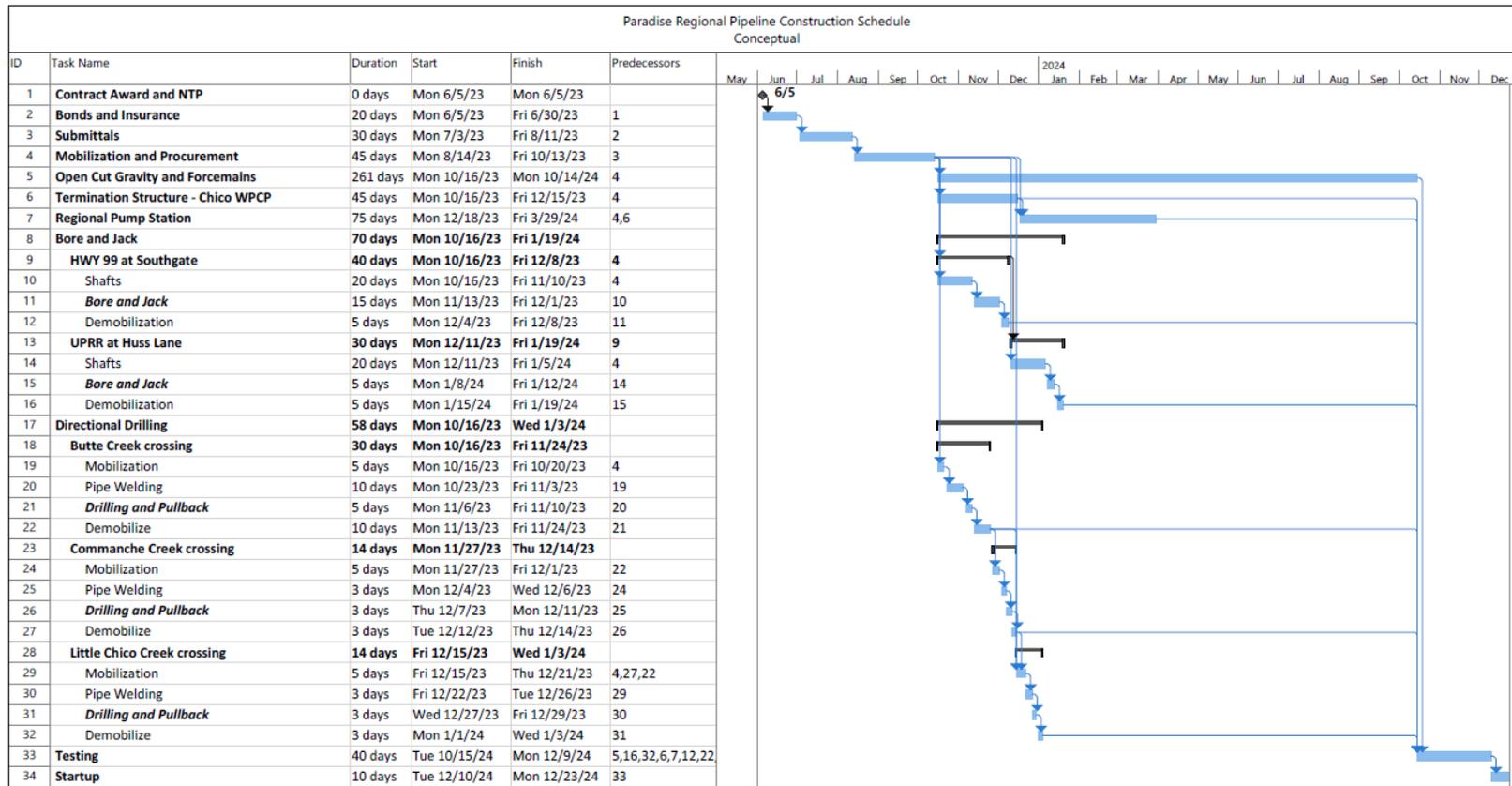


Figure 4. Estimated Export Pipeline Construction Schedule