Port Arthur

Main Contractor: Raito INC

CPM Scheduling Consultant: HSE CONTRACTORS INC.

Baseline Narrative:

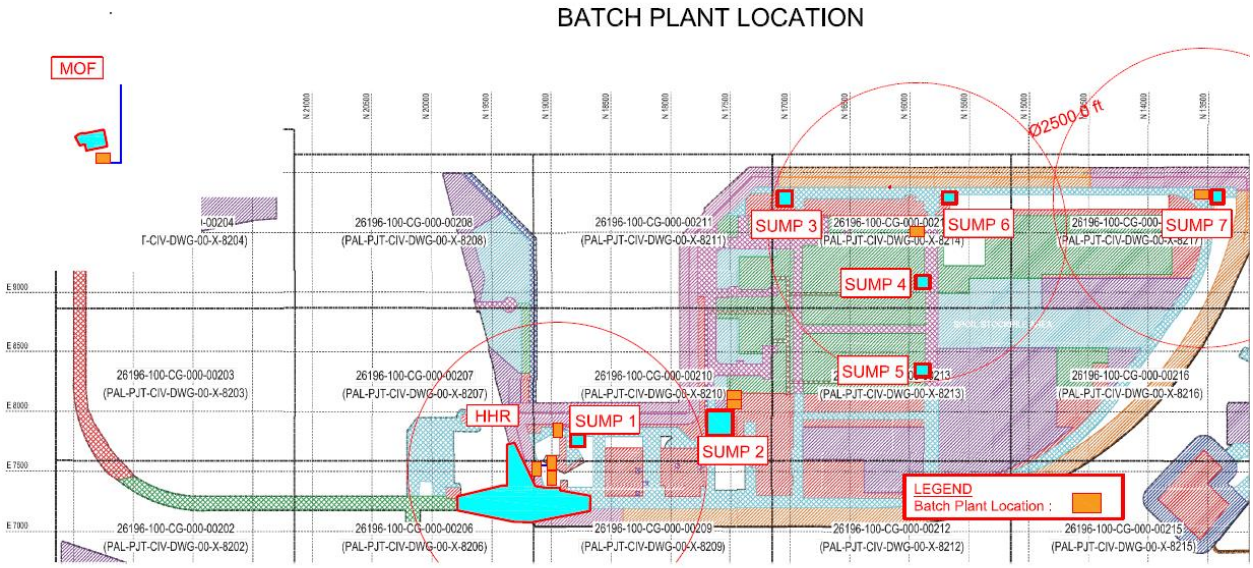
(Data Date: June 23,2023)

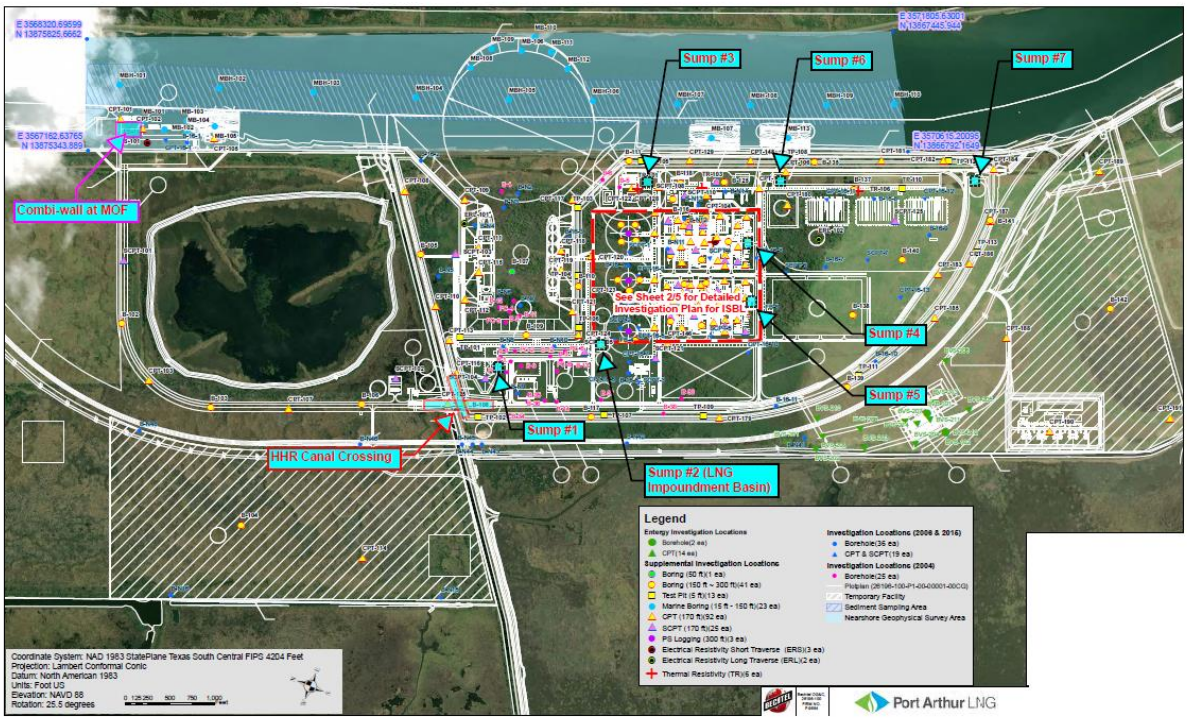
Award	June-23-2023
Mobilization Start Date	July-24-2023
Construction Start Date (Sump 3)	Aug-21-2023
Project Completion Date	April-08-2025

Contents

1. Project Information

1.1. Project Location and Plans





26196-100-HC1-CB00-00008eD
PAL-PJT-CSA-SOW-00-GEN-0008

26196-100-HC1-CB00-00008-Sketch #1 Site Plan

1.2. Scope of work

Raito, Inc. is responsible for performing the PALNG DMM (Deep Mixing Method) scope of work, and their plan involves various tasks and milestones. Before the site work begins, they will undertake preconstruction tasks such as preparing and delivering submittals, obtaining permits, conducting mix design soil sampling and testing, and other necessary preparations. Mobilization will involve deploying four base drill rigs, four grout batch plants, support equipment, and crews to different locations. The crews will perform the Preproduction Test Programs at specific sites. DMM production will commence sequentially based on access dates and production requirements. Each production area, such as Sumps and the MOF (Mobile Offices Facility), will be assigned specific crews and equipment groups. The crews will work on excavating, curing, coring, and testing the DMM in each area according to the production rates and completion milestones. The schedule accounts for any missed completion dates and factors in the 90-day lag for the MOF and HHR (Hot-Hedged Reservoir) before they are put into service. Crew personnel for each crew will consist of manual laborers and non-manual staff, while equipment requirements include various machinery and vehicles necessary for the DMM production process.

2. Project Phasing & Sequencing

2.1. Preconstruction

Prior to performing significant site work, Raito will perform Preconstruction Tasks including:

Preparing and delivering Submittals including Commercial Submittals; the HS&E Plan; the Field Execution Plan (FEP) for the Preproduction Test (PPT)Programs; the Contract Schedule and the DMM Design Report including performing CPTs.

Obtaining Permits including an Air Quality Registration/Permit by Rule (PBR) for cement grout plants from the TCEQ, a Temporary Water Use Permit from the TCEQ, and Development Permits from the City of Port Arthur for mobile offices if required.

Mix Design soil sampling, testing, and reporting. Other Preconstruction tasks as required.

2.2. Mobilization

Raito will mobilize four Base Drill Rigs, four Grout Batch Plants, four sets of support equipment, and four crews to perform the DMM scope of work. The first equipment group (Rig 1) will be staged at Sump 3, the second equipment group (Rig 2) will be staged at the HHR, the third equipment group (Rig 3) will be staged at the MOF, and the fourth equipment group (Rig 4) will be staged at the HHR. One crew will perform mobilization of all the equipment groups and additional crews will be mobilized when DMM production begins. Concurrent with mobilization, the first crew will also perform the PPT Programs at Sump 3, followed by the HHR, and the MOF. Note after completion of the MOF PPT, Rig 3 will be moved back to the HHR for production which will require 4 shifts.

2.3. DMM Production

Sequencing of the crews and equipment groups for DMM production is most influenced by the Access Milestones and the Production required to complete for each area or task.

AREA	ACCESS	COMP-LETION	DURATION (DAYS)	VOLUME (CY)	PRODUCTION (CY/DAY)
Sump 3	8/18/23	11/30/23	104	28,292	272
HHR	9/20/23	12/9/23	80	109,351	1367
Sump 7	12/7/23	1/31/24	55	9,376	170
Sump 6	12/7/23	1/26/24	50	9,376	188
MOF	12/12/23	3/15/24	94	30,141	321
Sump 2	4/8/24	10/4/24	179	101,191	565
Sump 4	4/8/24	5/28/24	50	11,677	234
Sump 5	5/15/24	6/28/24	44	11,677	265
Sump 1	1/24/25	4/8/25	74	8,625	117

Sump 3 is the first production to begin because of the early 8/18/23 Access Date. Sump 3 can be completed using one crew and equipment group (i.e., Rig 1) because the required average production rate is only 272 cubic yards/day. All “Sumps” will be excavated within 30 days after the Completion Milestone so curing, coring, and testing should be finished by the Completion Milestone. (NOTE, SUMP 3 PRODUCTION AND TESTING MISSES THE COMPLETION BY 4 DAYS.) Rig 1 will move to Sump 6 which will require 4 shifts.

Next, production in the HHR will begin because of the 9/20/23 Access Date. The work will be performed using three crews and equipment groups (i.e., Rigs 2, 3, and 4) due to the required high average production rate is only 1,367 cubic yards/day. The MOF and HHR will not be in service for 90 days after the Completion Milestone, so curing, coring, and testing can be completed after the Completion Milestone. (NOTE, HHR PRODUCTION MISSES THE COMPLETION DATE BY 3 DAYS, BUT CONSIDERING THE 90 DAY LAG BEFORE

SERVICE WILL MEET THE SCHEDULE.) Rig 2 will move to Sump 7 which will require 4 shifts. Rigs 3 and 4 will demob which will require 7 shifts each.

Sump 6 has an Access Date of 12/7/23 and requires an average production rate is only 188 cubic yards/day. Rig 1 will complete Sump 6. (NOTE, SUMP 6 PRODUCTION AND TESTING MISSES THE COMPLETION BY DATE BY 1 DAY.) Rig 1 will move to the MOF which will require 4 shifts.

Sump 7 has an Access Date of 12/7/23 and requires an average production rate is only 170 cubic yards/day. Rig 2 will complete Sump 7. (NOTE, SUMP 6 PRODUCTION AND TESTING MISSES THE COMPLETION BY DATE BY 10 DAY.) Rig 2 will move to Sump 4 which will require 4 shifts.

The MOF has an access date of 12/12/23 and requires an average production rate of 321 cubic yards/day. Rig 1 will complete the MOF. (NOTE, MOF PRODUCTION MAKES THE COMPLETION DATE, ESPECIALLY CONSIDERING THE 90 DAY LAG BEFORE SERVICE.) Rig 1 will move to Sump 2 which will require 4 shifts.

Sump 2 has an access date of 4/8/24 and requires an average production rate of 565 cubic yards/day. Rig 1 will complete Sump 2. (NOTE, SUMP 2 PRODUCTION AND TESTING MAKES THE COMPLETION BY DATE.) Rig 1 will demob which will require 7 shifts.

Sump 4 has an access date of 4/8/24 and requires an average production rate of 234 cubic yards/day. Rig 2 will complete Sump 4. (NOTE, SUMP 2 PRODUCTION AND TESTING MAKES THE COMPLETION BY DATE.) Rig 2 will move to Sump 5 which will require 4 shifts.

Sump 5 has an access date of 5/15/24 and requires an average production rate of 265 cubic yards/day. Rig 2 will complete Sump 5. (NOTE, SUMP 5 PRODUCTION AND TESTING MISSES THE COMPLETION BY DATE BY 5 DAY.) Rig 2 will move to storage for future use on Sump 1 which will require 4 shifts.

Sump 1 has an access date of 1/24/25 and requires an average production rate of 265 cubic yards/day. Rig 2 will move from storage to complete Sump 1 which will require 7 shifts. (NOTE, SUMP 1 PRODUCTION AND TESTING MAKES THE COMPLETION BY DATE.) Rig 2 will demob which will require

3. Key Dates

Item	Start Date	Finish Date
Award	23-June-2023	23-June-2023
Mobilization DSM RIG 1	24-July-2023	05-Aug-2023
Mobilization DSM RIG 2	07-Aug-2023	15-Aug-2023
Mobilization DSM RIG 3	16-Aug-2023	24-Aug-2023
Mobilization DSM RIG 4	25-Aug-2023	02-Sep-2023
Construction (Sump 3) (Refrigerant Storage)	21-Aug-2023	18-Dec-2023
HHR Canal Crossing	30-Aug-2023	02-Feb-2024
HHR / MOF Ro-Ro	05-Sep-2023	20-Mar-2024
Sump 6 (Ground Flare-North)	07-Dec-2023	27-Jan-2024
Sump 7 (Ground Flare-South)	13-Jan-2024	28-Feb-2024
Sump 2 (Tank3)	08-Apr-2024	02-Oct-2024
Sump 4 (Train 1)	08-Apr-2024	28-May-2024
Sump 5 (Train 2)	15-May-2024	03-July-2024
Sump 1 (Building Marine Flare)	16-Jan-2025	11-Mar-2025
Demobilization DSM RIG 3	05-Jan-2024	16-Jan-2024
Demobilization DSM RIG 4	05-Jan-2024	12-Jan-2024
Demobilization DSM RIG 1	12-Sep-2024	19-Sep-2024
Demobilization DSM RIG 2	20-Feb-2025	27-Feb-2025
Final Site Demobilization	18-Mar-2025	26-Mar-2025
Project Completion Date	08-Apr-2025	08-Apr-2025

4. WBS

The below figure is extracted from the baseline schedule of the project on the P6 software and shows all WBS levels. The table reflects how the contractor can manage all project tasks and monitor their progress separately and/ or collectively. The Milestones section includes all important milestones for the project. The Preconstruction & Submittals sections includes major submittals required by the contract and specifications. And the Construction Section is divided into Sumps as shown.

PORT ARTHUR
WBS SUMMARY

Activity ID	Activity Name	Original Duration	Start	Finish
PORTARTHUR		468	23-Jun-2023	08-Apr-2025
Milestones Baseline		656	23-Jun-2023	08-Apr-2025
Submittals		47	23-Jun-2023	19-Aug-2023
Permits		23	26-Jun-2023	24-Jul-2023
Mobilization		35	24-Jul-2023	02-Sep-2023
Sump 3 (Refrigerant Storage)		98	21-Aug-2023	18-Dec-2023
HHR Canal Crossing		124	30-Aug-2023	02-Feb-2024
HHR / MOF Ro-Ro		158	05-Sep-2023	20-Mar-2024
Sump 6 (Ground Flare-North)		39	07-Dec-2023	27-Jan-2024
Sump 7 (Ground Flare-South)		39	13-Jan-2024	28-Feb-2024
Sump 2 (Tank 3)		147	08-Apr-2024	02-Oct-2024
Sump 4 (Train 1)		43	08-Apr-2024	28-May-2024
Sump 5 (Train 2)		41	15-May-2024	03-Jul-2024
Sump 1 (Building Marine Flare)		46	16-Jan-2025	11-Mar-2025
Demobilization		372	05-Jan-2024	08-Apr-2025

5. Calendars

This section contains details on the calendars which are assigned on all activities. The calendar usage and assignment demonstrate that the builder has taken into account all official Weekends specified by the contract, and has scheduled the project activities efficiently to minimize any risk on project completion. The Calendars used in this project are:

6 Days: the calendar is based on a 6-day week and recognizes weekends as non-working days and is assigned to construction activities, Submittals, Permits, Mobilization & Demobilization. Recognized holidays as follows:

table listing the major holidays in the United States from June 23, 2023, to April 8, 2025:

Date	Holiday
July 4, 2023	Independence Day
September 4, 2023	Labor Day
October 9, 2023	Columbus Day
November 10, 2023	Veterans Day
November 23, 2023	Thanksgiving Day
December 25, 2023	Christmas Day
January 1, 2024	New Year's Day
January 15, 2024	Martin Luther King Jr. Day
February 19, 2024	Presidents Day
May 28, 2024	Memorial Day
July 4, 2024	Independence Day

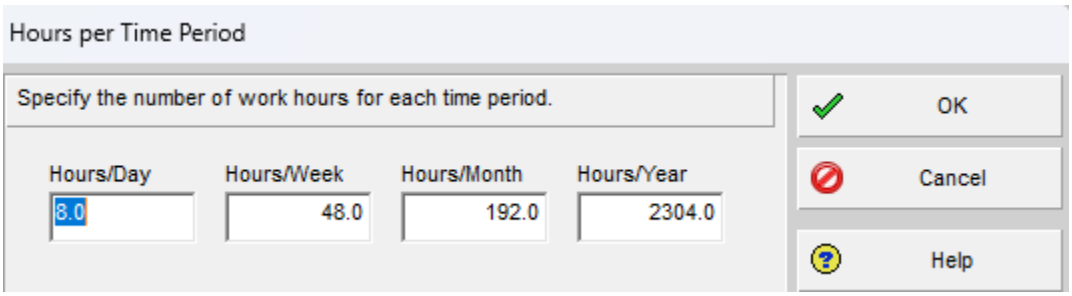
Date	Holiday
September 2, 2024	Labor Day
October 14, 2024	Columbus Day
November 11, 2024	Veterans Day
November 28, 2024	Thanksgiving Day
December 25, 2024	Christmas Day
January 1, 2025	New Year's Day
January 20, 2025	Martin Luther King Jr. Day
February 17, 2025	Presidents Day
May 26, 2025	Memorial Day

Please note that this table includes the major national holidays observed in the United States. There may be additional regional or state-specific holidays that are not listed here.

7 DAY CALENDER: the calendar is based on a 7-day week as working days and is assigned to milestones activities.

6. Working hours

The working hours are 8 hours per day, totalling 48 hours per week and 192 hours per month. These work durations have been used throughout all scheduled construction activities to calculate durations and remaining time to complete.



7. Critical path

The Critical Path in the Baseline starts with the Develop / Submit DMM Design Report which starts on the 23rd of June 2023. And expected to be finished on the 8th of April 2025.

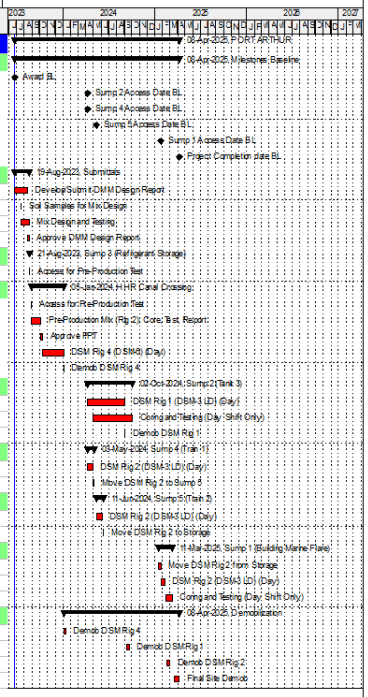
The project schedule for the Port Arthur initiative delineates a critical path that is vital for its successful execution within the projected timeline.
The project's start date is set for June 23, 2023, with the baseline extending until April 8, 2025, culminating in the Project Completion date. This timeline is punctuated by significant milestones, including the Award Baseline, which marks the commencement of the project, and the subsequent Access Dates for various sumps and tanks.
The critical path is shaped by a series of interconnected activities that must be meticulously orchestrated. Beginning with the development and approval of the Design, Materials, and Methods (DMM) report by August 11, 2023, this initial phase sets the groundwork for the entire project. Swift approval of this report is pivotal, as it dictates subsequent actions.
Access dates for essential sumps and tanks are crucial junctures in the timeline. For instance, the Sump 2 Access Date (April 8, 2024) and the Sump 4 Access Date (April 8, 2024) are imperative for unimpeded progress. Similarly, access to Sump 5 by May 15, 2024, and Sump 1 by January 24, 2025, significantly shape the path forward.
Key rig activities hold significant weight within the critical path. Rig 2's involvement is particularly noteworthy in several stages, from conducting pre-production tests and core analyses to facilitating its movement between different locations.
The HHR Canal Crossing, spanning from August 30, 2023, to January 5, 2024, encapsulates a complex process with dependencies that must be meticulously managed to maintain the critical path.
The approval of the Pre-Production Mix (PPT) by October 12, 2023, signifies a pivotal point, ensuring that the project remains on track. Similarly, the timeline for Rig 4 activities from October 13, 2023, to January 4, 2024, underscores the importance of expeditious rig-related tasks.
Critical tasks related to constructing sumps and tanks, such as Sump 2 (April 8, 2024 - October 2, 2024) and Sump 4 (April 8, 2024 - May 3, 2024), demand careful attention due to their impact on overall progress.
Moreover, the movement of Rig 2 to different locations, its involvement in testing, and subsequent storage is intricately tied to the critical path.
As the project draws to a close, activities such as building marine flare structures at Sump 1 and completing coring and testing by March 11, 2025, hold significant weight. The final

site demobilization between March 18, 2025, and April 8, 2025, signifies the conclusive phase of the critical path.

Throughout the project, diligent management of these interconnected activities is imperative to mitigate potential disruptions and ensure that the critical path is adhered to. Any deviations could reverberate across the project's timeline, emphasizing the importance of precise execution to meet the objectives within the allocated timeframe.

PORT ARTHUR
Critical Path

Activity ID	Activity Name	Original Duration	Start	Finish
PORTARTHUR		466	23-Jun-2023	08-Apr-2025
Milestones Baseline		656	23-Jun-2023	08-Apr-2025
A1160	Award BL	0	23-Jun-2023*	
A1290	Sump 2 Access Date BL	0	08-Apr-2024*	
A1300	Sump 4 Access Date BL	0	08-Apr-2024*	
A1310	Sump 5 Access Date BL	0	15-May-2024*	
A1350	Sump 1 Access Date BL	0	24-Jan-2025*	
A1360	Project Completion date BL	0		08-Apr-2025*
Submittals		47	23-Jun-2023	19-Aug-2023
A0009	Develop/Submit DMM Design Report	40	23-Jun-2023	11-Aug-2023
A0007	Soil Samples for Mix Design	3	17-Jul-2023	19-Jul-2023
A0008	Mix Design and Testing	25	20-Jul-2023	19-Aug-2023
A0010	Approve DMM Design Report	7	12-Aug-2023	19-Aug-2023
Sump 3 (Refrigerant Storage)		0	21-Aug-2023	21-Aug-2023
A0021	Access for Pre-Production Test	0	21-Aug-2023	21-Aug-2023
HHR Canal Crossing		99	30-Aug-2023	05-Jan-2024
A0028	Access for Pre-Production Test	0	30-Aug-2023	30-Aug-2023
A0029	Pre-Production Mix (Rig 2), Core, Test, Report	30	30-Aug-2023	04-Oct-2023
A0030	Approve PPT	6	05-Oct-2023	12-Oct-2023
A0034	DSM Rig 4 (DSM6) (Day)	63	13-Oct-2023	04-Jan-2024
A0042	Demob DSM Rig 4	0	05-Jan-2024	05-Jan-2024
Sump 2 (Tank 3)		141	08-Apr-2024	02-Oct-2024
A0072	DSM Rig 1 (DSM3 LD) (Day)	125	08-Apr-2024	04-Sep-2024
A0051	Coring and Testing (Day Shift Only)	125	29-Apr-2024	02-Oct-2024
A0053-1	Demob DSM Rig 1	1	04-Sep-2024	04-Sep-2024
Sump 4 (Train 1)		23	08-Apr-2024	03-May-2024
A0066	DSM Rig 2 (DSM3 LD) (Day)	19	08-Apr-2024	29-Apr-2024
A0069	Move DSM Rig 2 to Sump 5	4	30-Apr-2024	03-May-2024
Sump 5 (Train 2)		23	15-May-2024	11-Jun-2024
A0077	DSM Rig 2 (DSM3 LD) (Day)	19	15-May-2024	06-Jun-2024
A0080	Move DSM Rig 2 to Storage	4	07-Jun-2024	11-Jun-2024
Sump 1 (Building Marine Flare)		46	16-Jan-2025	11-Mar-2025
A0075	Move DSM Rig 2 from Storage	7	16-Jan-2025	23-Jan-2025
A0081	DSM Rig 2 (DSM3 LD) (Day)	15	24-Jan-2025	10-Feb-2025
A0078	Coring and Testing (Day Shift Only)	21	14-Feb-2025	11-Mar-2025
Demobilization		372	05-Jan-2024	08-Apr-2025
A0093	Demob DSM Rig 4	7	05-Jan-2024	12-Jan-2024
A0095	Demob DSM Rig 1	7	12-Sep-2024	19-Sep-2024
A0083-1	Demob DSM Rig 2	7	20-Feb-2025	27-Feb-2025
A0002	Final Site Demob	18	18-Mar-2025	08-Apr-2025



Remaining Level of Effort
Actual Work
Remaining Work
Critical Remaining Work
Milestone
Summary

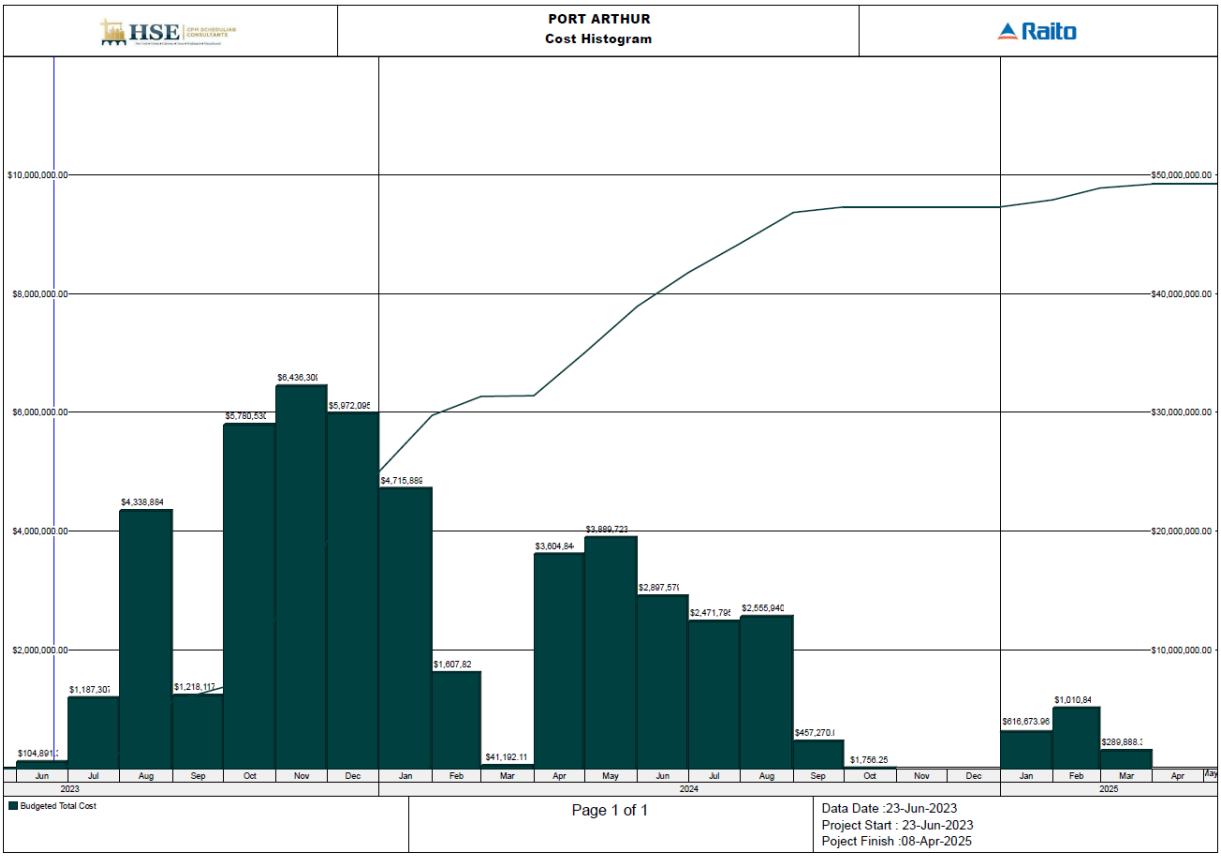
Page 1 of 1

Data Date :23-Jun-2023
Project Start : 23-Jun-2023
Poject Finish :08-Apr-2025

8. Cost Histogram

A cost histogram is a graphical representation or chart that displays the distribution of costs for different elements or categories within a project.

For our project, the cost histogram depicts the timeline of cost distribution. It Started in 2023 with $ 104,891,3, with the highest expenditure occurring in Nov. 2023 reaching $6,436,309.89. While the planned cumulative cost for the entire project is estimated to be $49,199,356. The cost histogram provides a visual representation of these cost variations throughout the project duration.



8.2 June-2023 Cost Distribution Illustration for (Develop/Submit (DMM Design Report)):

- Cost in June 2023 = $ 104,891.33 which comes from the activity (Develop/Submit (DMM Design Report).
- Total Cost for the Activity (Develop/Submit (DMM Design Report)= **$ 599,379** = $ 104,891.33 + $ 359,624.40 + $134,860.28 divided as shown in the next figure.
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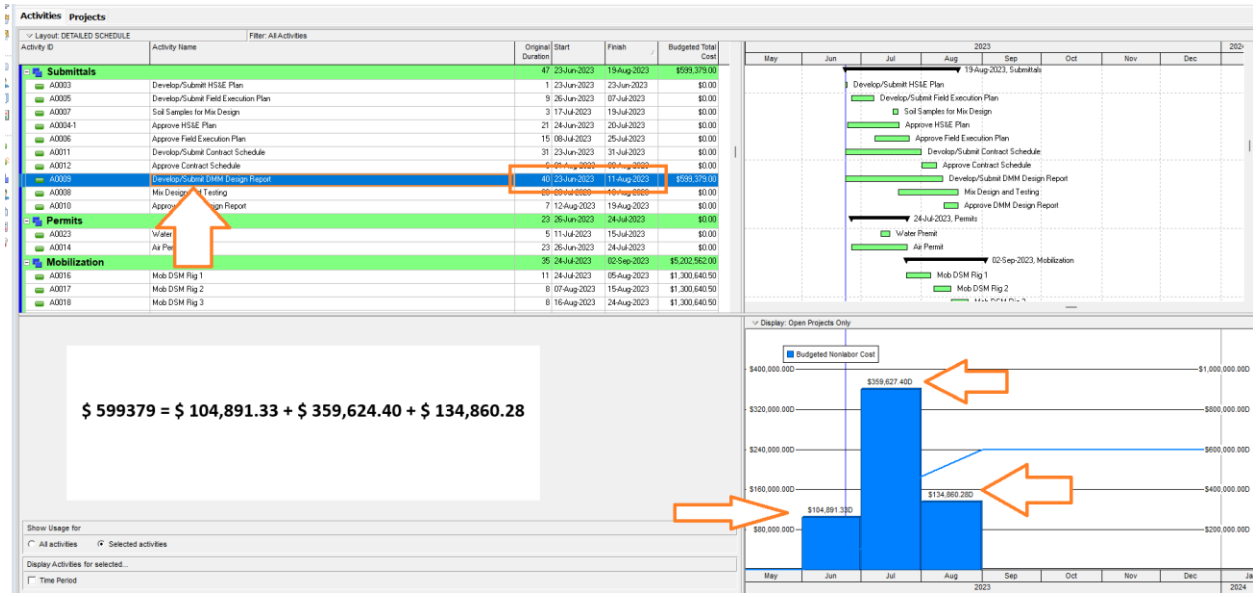
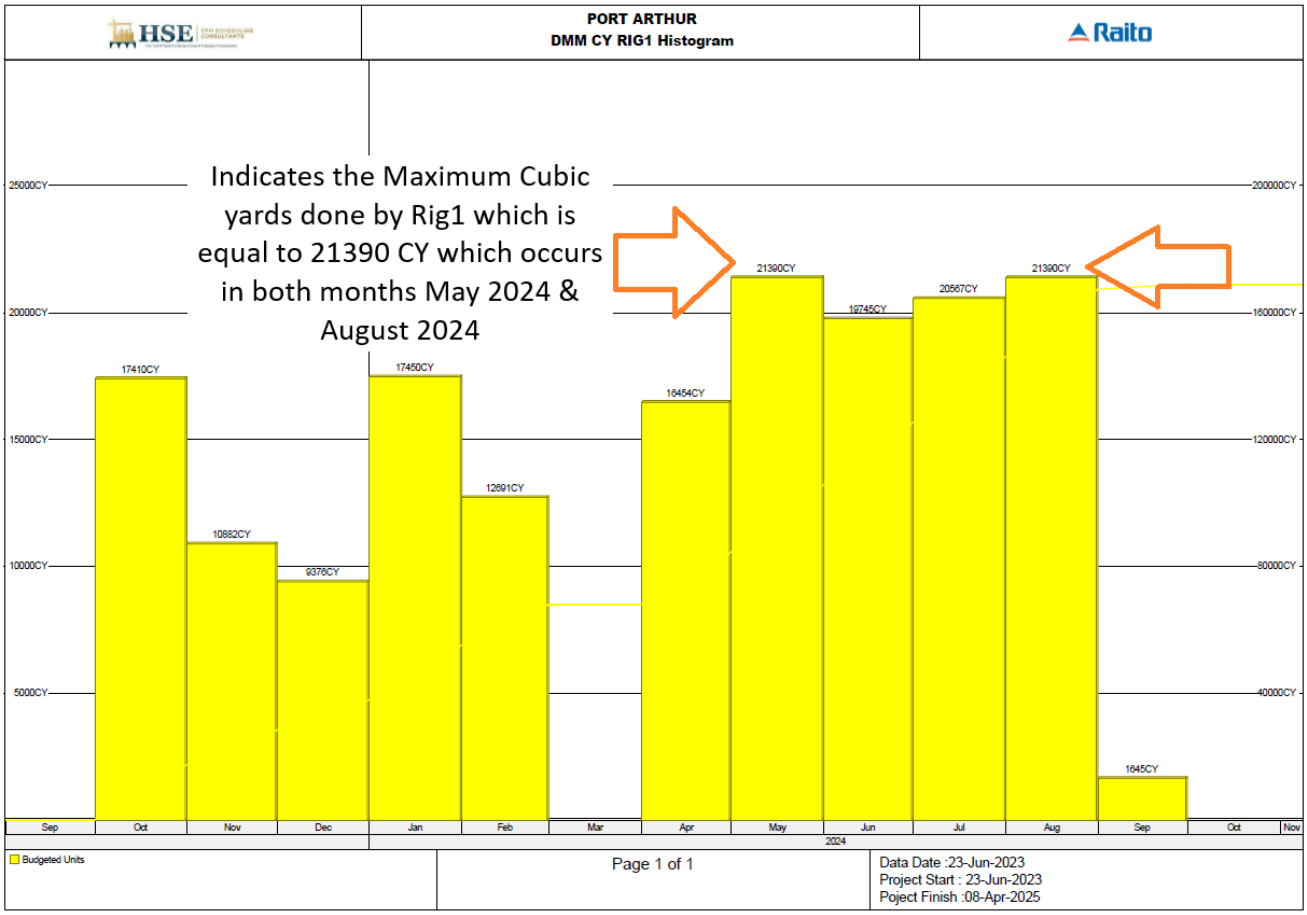


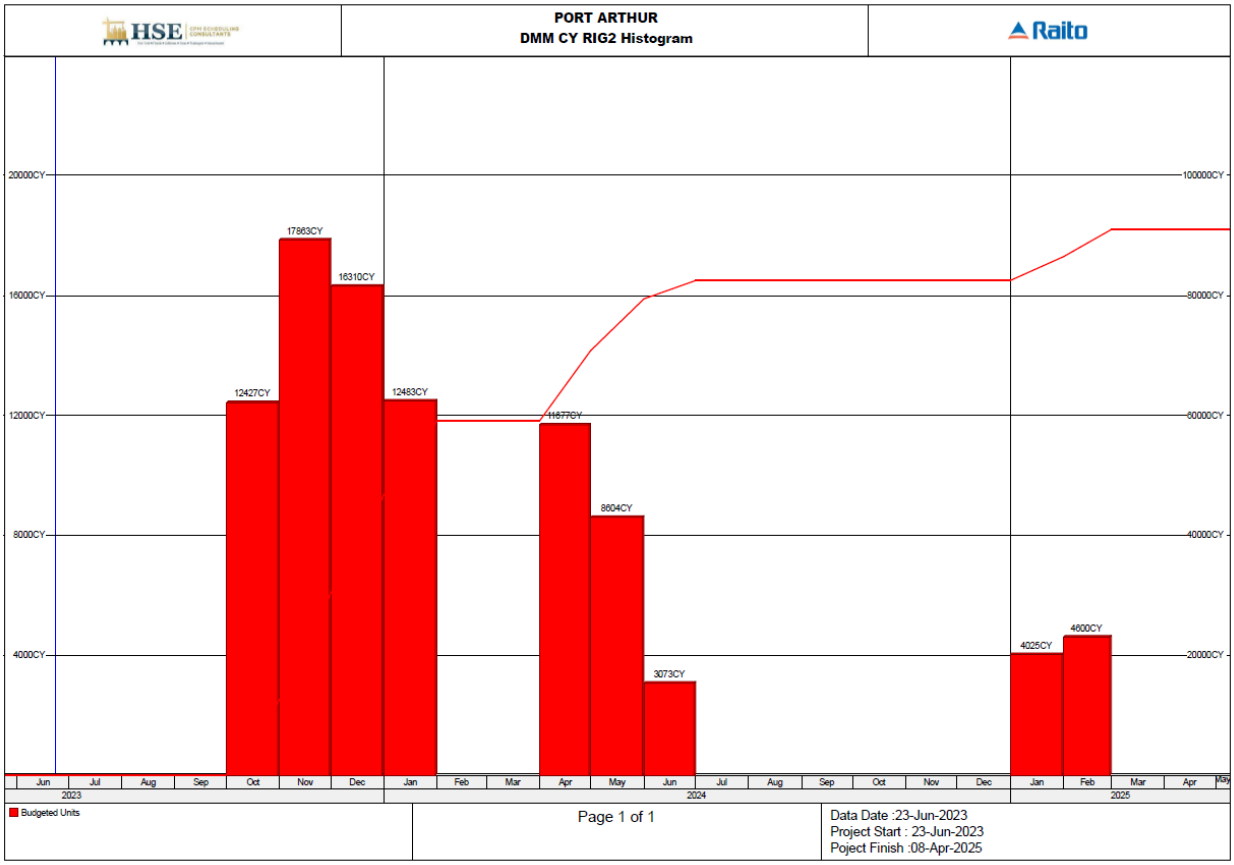
9.Rigs Cubic Yards Histograms

9.1. Rig1



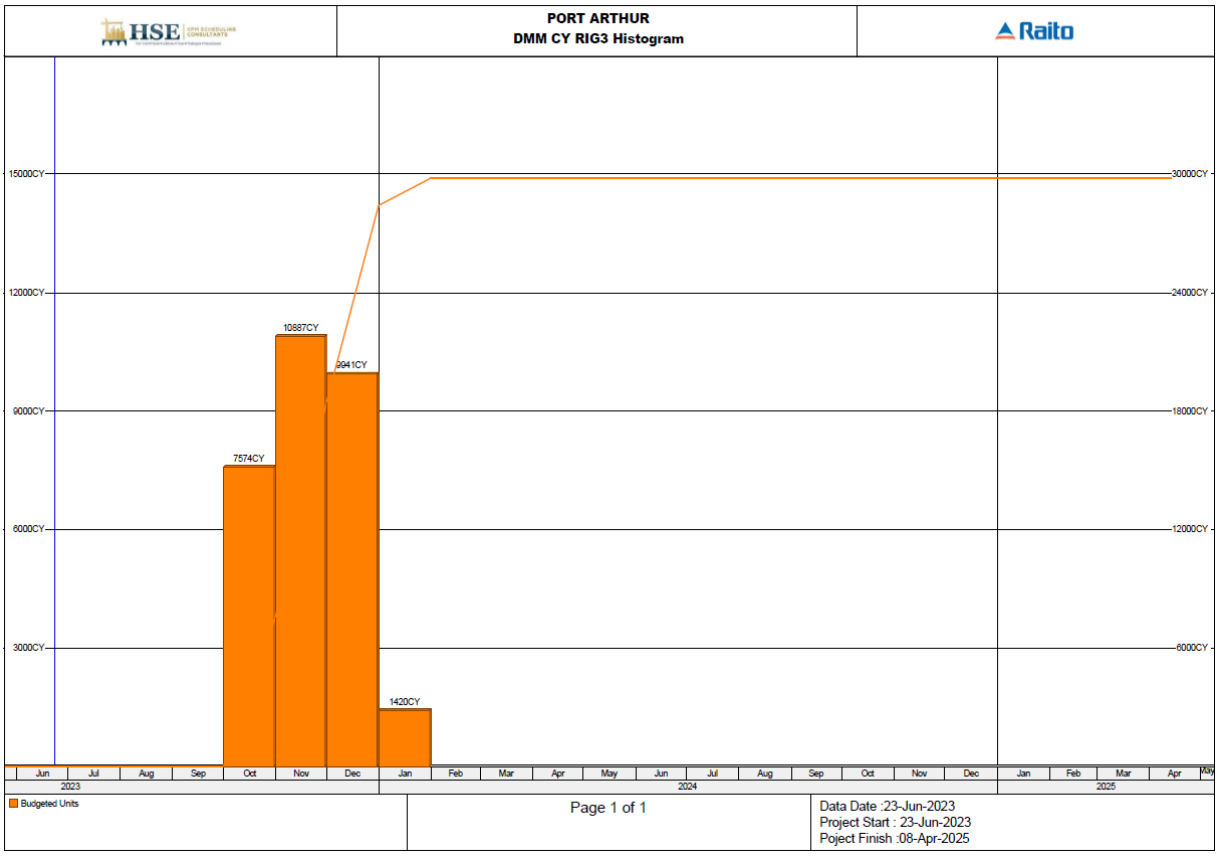
- The maximum cubic yard amount shown in the histogram is 213,900CY, which occurs in the month with the highest value which is May 2024 as well as August 2024. On the other hand, the minimum cubic yard value displayed is in March 2024 which is a no working month for Rig1.

9.2 Rig2



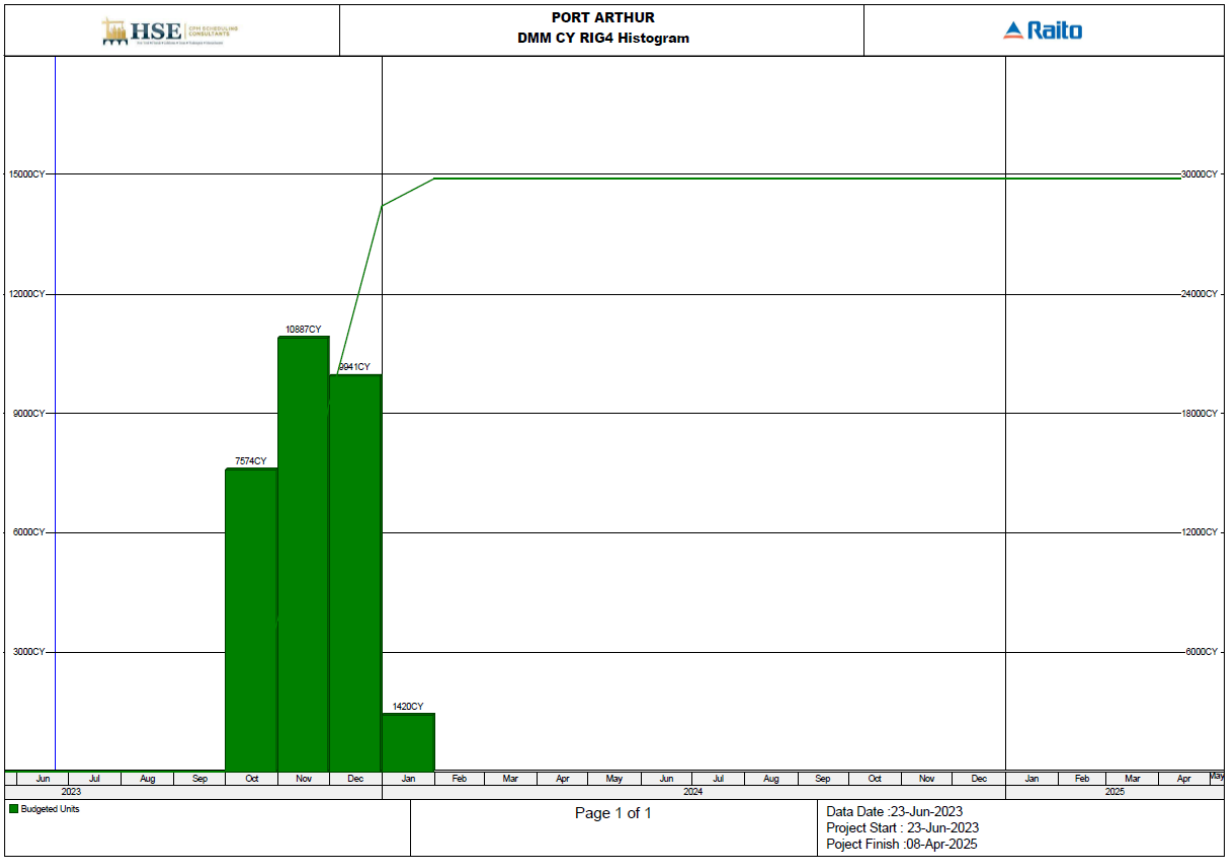
- The maximum cubic yard amount shown in the histogram is 17863CY, which occurs in the month with the highest value which is November 2023.

9.3 Rig3



- The maximum cubic yard amount shown in the histogram is 10887CY, which occurs in the month with the highest value which is November 2023. On the other hand, the minimum cubic yard value displayed is in Jan 2024 which equals to 1420CY (cubic yard).

9.4 Rig4



- The maximum cubic yard amount shown in the histogram is 10887CY, which occurs in the month with the highest value which is November 2023. On the other hand, the minimum cubic yard value displayed is in Jan 2024 which equals to 1420CY (cubic yard).

10. Conclusion

Calendars

This section contains details on the calendars which are assigned on all activities. The calendar usage and assignment demonstrate that the builder has taken into account all official Weekends specified by the contract, and has scheduled the project activities efficiently to minimize any risk on project completion. The Calendars used in this project are:

6 DAYS CALENDAR: the calendar is based on a 6-day week and recognizes weekends as non-working days and is assigned to construction activities, Submittals, Permits, Mobilization & Demobilization.

7 DAY CALENDER: the calendar is based on a 7-day week as working days and is assigned to milestones activities.

Critical path

The critical path for the Port Arthur initiative, starting on June 23, 2023, and ending on April 8, 2025, plays a vital role in the project's successful execution within the projected timeline. Key milestones, including the Award Baseline and various sump and tank access dates, punctuate the baseline. The Develop/Submit DMM Design Report, commencing on August 11, 2023, sets the groundwork for the project, followed by crucial rig activities and the HHR Canal Crossing. Approval of the Pre-Production Mix and Rig 4 activities are essential for maintaining progress. Construction of sumps and tanks, movement of Rig 2, and coring and testing activities are intricately tied to the critical path. The completion of marine flare structures and site demobilization mark the conclusive phase. Diligent management of these interconnected activities is paramount to avoid disruptions and ensure adherence to the critical path, as any deviations can have a significant impact on the project's timeline and objectives