Operations & Engineering Workgroup

May 15, 2024

Sites

Agenda

1.1 – Discuss CMAR strategy and process relative to cost certainty, schedule certainty, change management, and labor.

1.2 – 30% Design overview and receive input on process for owner review and acceptance

1.3 – Review assumptions related to the independent cost estimate review and value engineering considerations

Engineering and Construction Manager's Report

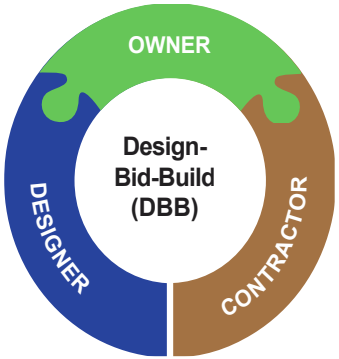
Agenda Item 1.1

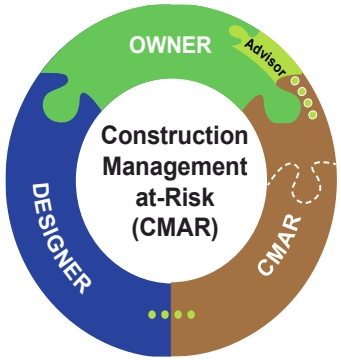
Discuss CMAR strategy and process relative to cost certainty, schedule certainty, change management, and labor

Jeff Kivett

Sites

What is Construction Management at Risk?





Types of Relationships

- No Contractual Relationship
- Contractual Relationship
- Contract Amendment for GMP or Fixed Price
- Embedded Relationship
  (not contractual, but required critical interaction)

CMAR Primary Attributes

Procurement: Selection of CMAR emphasizes qualifications and occurs relatively early in the design development process

Phase 1: Preconstruction Phase

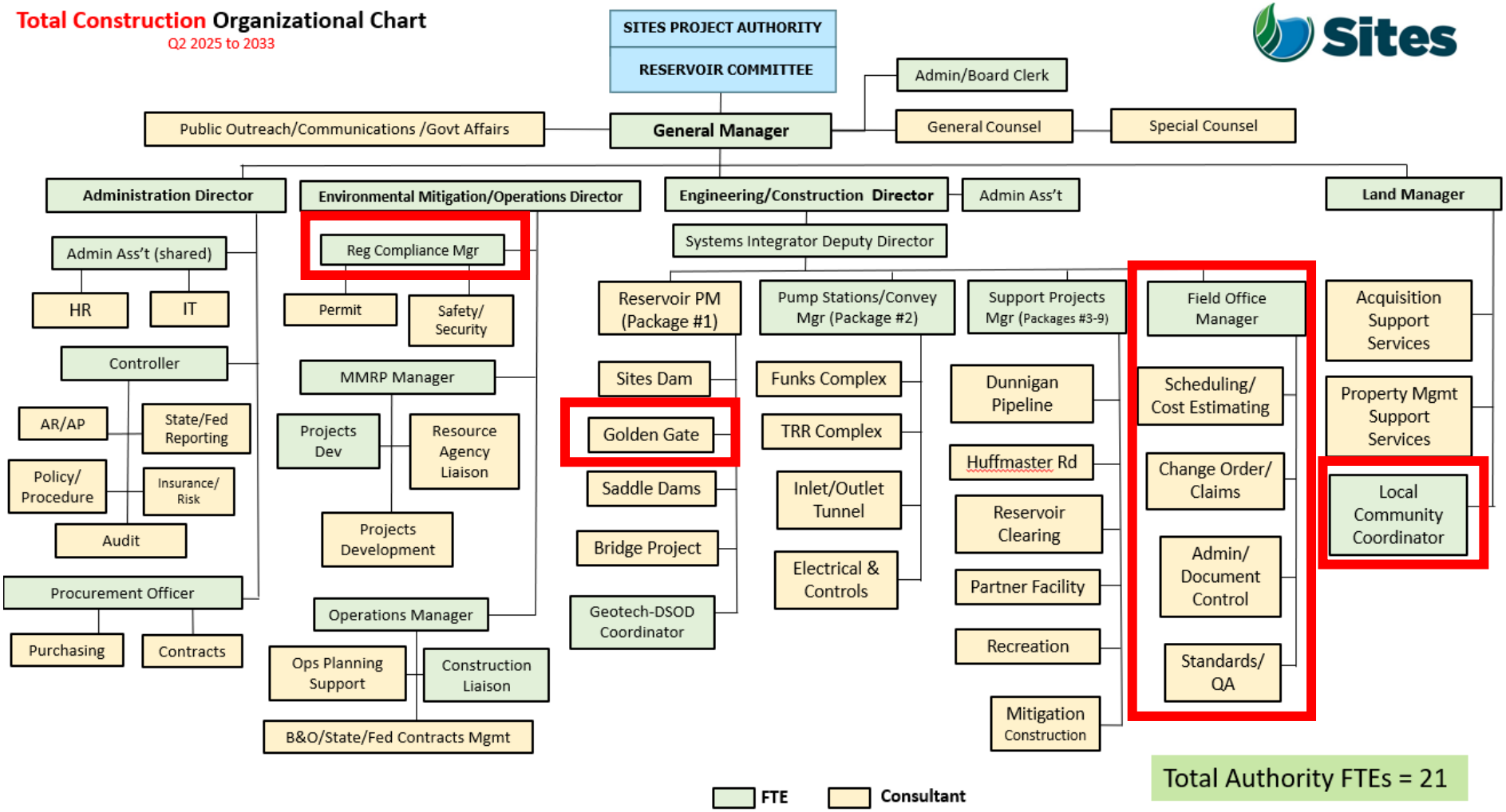
- Design by the engineer is progressed in parallel with construction planning, scheduling and cost estimating by the CMAR, reduces delivery risk.
- Input to design and construction planning often under an hourly-based services contract.
- Development of template and “open book” cost estimate for construction.
- Cost estimate is refined as design progresses and costs information is developed / solicited.
- Fees (OH/Profit) are added to costs to create a price for construction.
- Availability of the “off-ramp” if agreement on construction pricing can’t be reached.

CMAR Primary Attributes

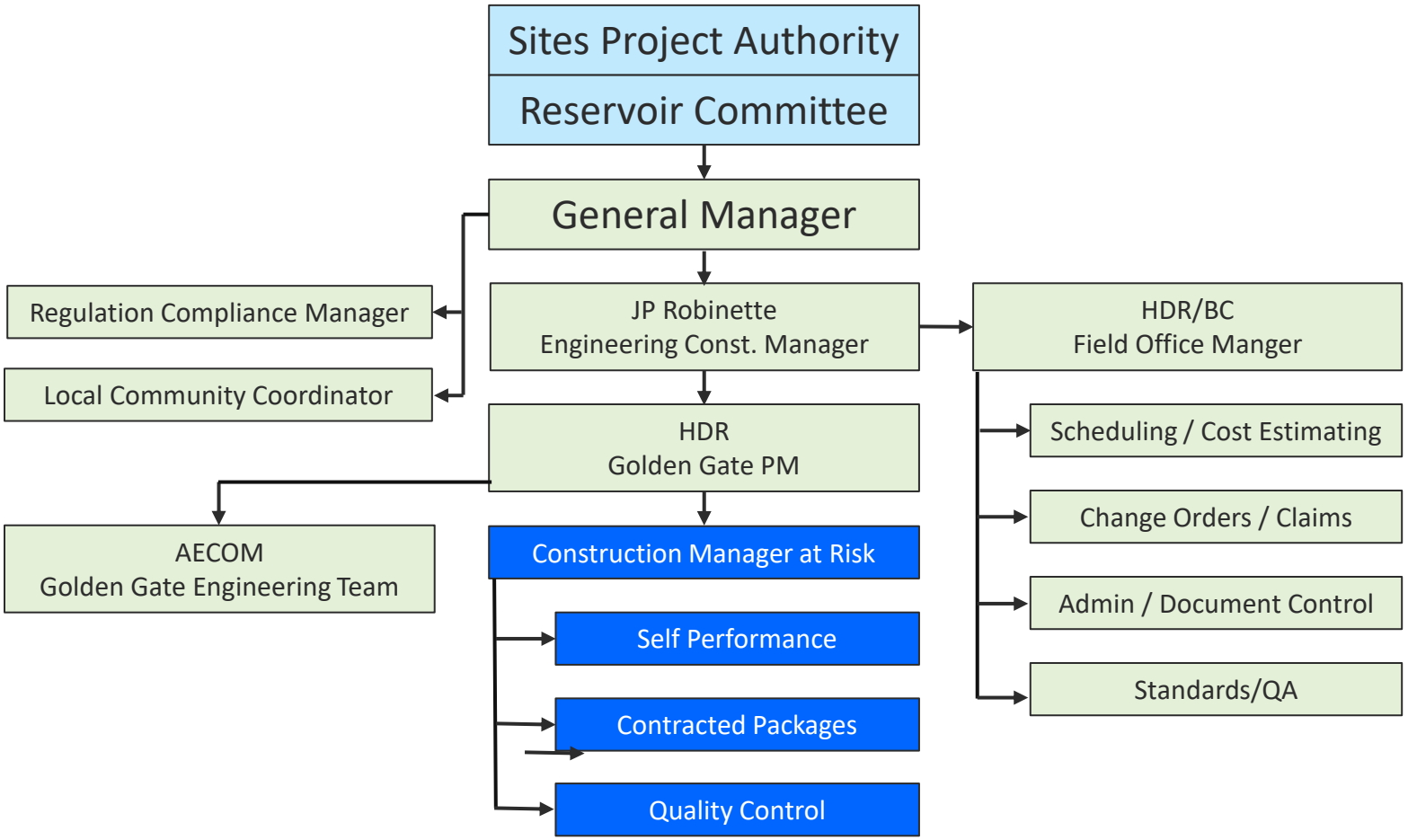
Phase 2 Construction

- Similar to a standard construction contract.
  - Some constructability risk transferred to CMAR
- Potential for shared savings if project cost comes in under the GMP (serves as incentive for the CMAR to find cost savings/efficiencies).
- Direct construction work may be subcontracted or self-performed.

Conceptual Construction Organization



Golden Gate Dam Org Chart



Guaranteed Maximum Price (GMP)

- Negotiated price for a set scope of work
- Development of CMAR's Procurement Plan
  - Owner Approves Plan
  - Breaks work into defined scopes that will be turned into a GMP
    - Can consist of self performed work or sub-contracted work
  - Example of potential GMPs for GG Dam
    - Early out Package – Mobilization, trailer complex, construction utilities, site access
    - Excavation and Bypass facilities
    - Foundation
    - Dam

Who does the work?

Self Perform Work	Sub Contracted Work
The CMAR contractor performs the work with labor and equipment directly hired and obtained	The CMAR Contractor manages the work of a sub-contractor
The cost of work is built up of quantity and production rates for materials, labor, and equipment for the given scope of work	The cost of work is determined through a bidding process for a given scope of work
An Independent Cost Estimate (ICE) is developed by the Authority	The CMAR is responsible for the Sub-contractor performance and quality of work

GMP can be a combination of both Self Performed and Sub-Contracted work

Development of a GMP

- Example – Excavation Package
  - Will contain both self performed work and sub-contracted work
    - Potential Scope of Self Performed work
      - Excavating Material from the site
      - Hauling of excavated material and stockpiling
    - Potential of sub-contracted work
      - Blasting
      - Processing of material
      - Stabilization of stockpiled material
      - Dewatering of excavation
- CMAR will accumulate all these cost and apply agreed to fees and contingency to develop the GMP
  - GMP can be implemented as Lump Sum or Actual Cost
  - If GMP is not agreed to the Authority has the right to off-ramp the GMP from the CMAR

Discussion – CMAR Benefits

How can the CMAR help the Authority accelerate the schedule?

How do we realize the cost and schedule benefits of CMAR?

- Collaboration, trust, clear expectations

What qualifications are most important to your agency?

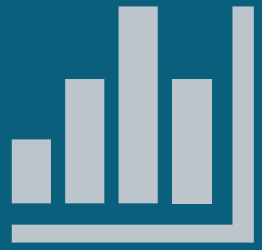
Discussion – CMAR and Governance

What is the approximate contracting authority needed for pre-construction? How about for construction?

Will the RC/AB approve each GMP? What if we can't agree on a GMP?

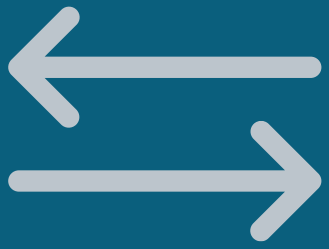
Will the RC/AB approve proceeding with construction on individual packages when self-performing? When bid out?

Discussion – CMAR Mechanics



How will the cost of the project be defined over time?

What are some ways self-performance of work can occur in a CMAR process? How is it proposed to work for Sites?



How are change orders handled in a CMAR process?

Questions?

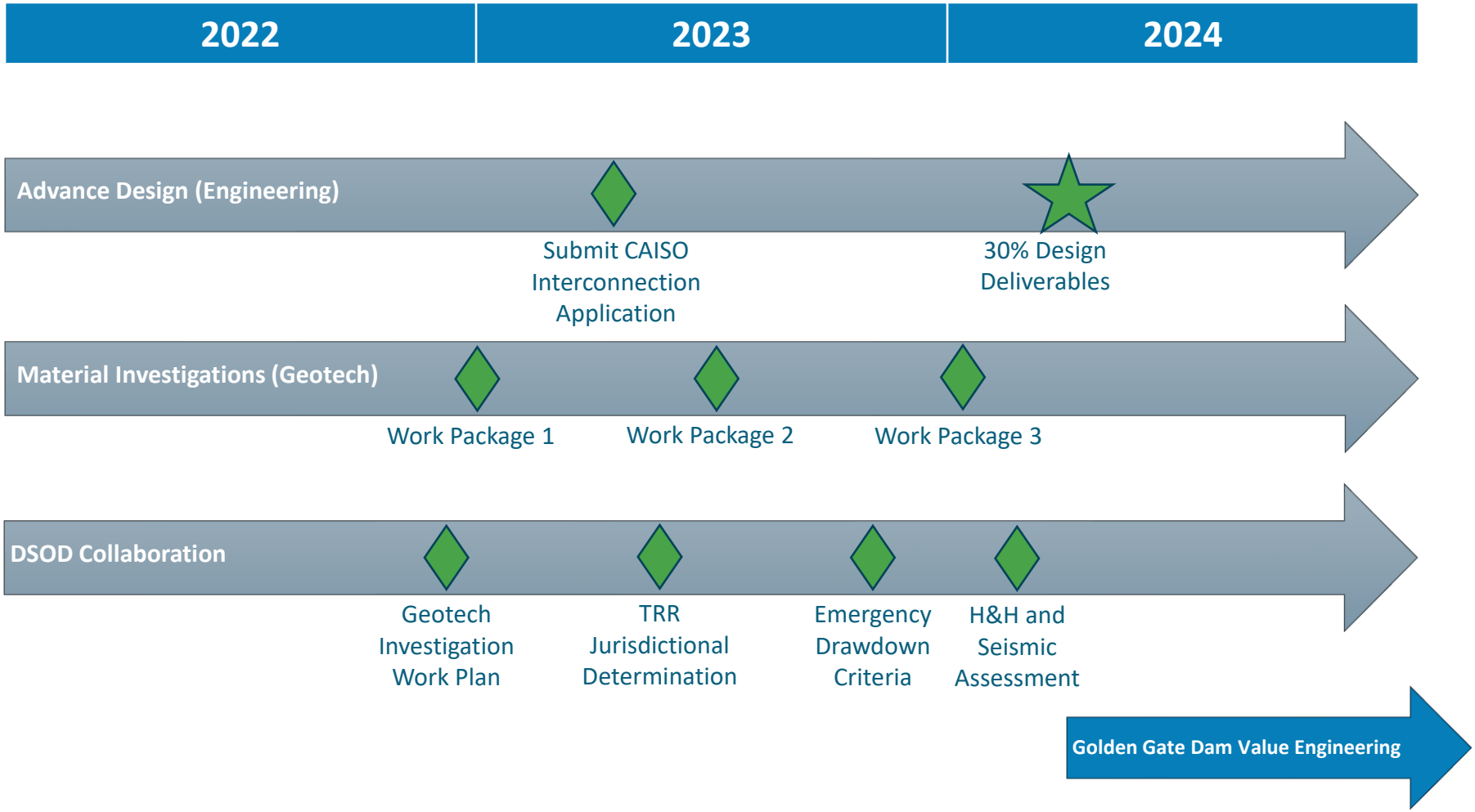
Agenda Item 1.2

30% Design overview and receive input on process for Owner review and acceptance

Mike Smith / Pete Rude / Henry Luu

Sites

Where are we today?



Reservoir Updates:

Main Dams
- Dam Section
- Diversions
- Borrow, Stockpile and Staging Areas

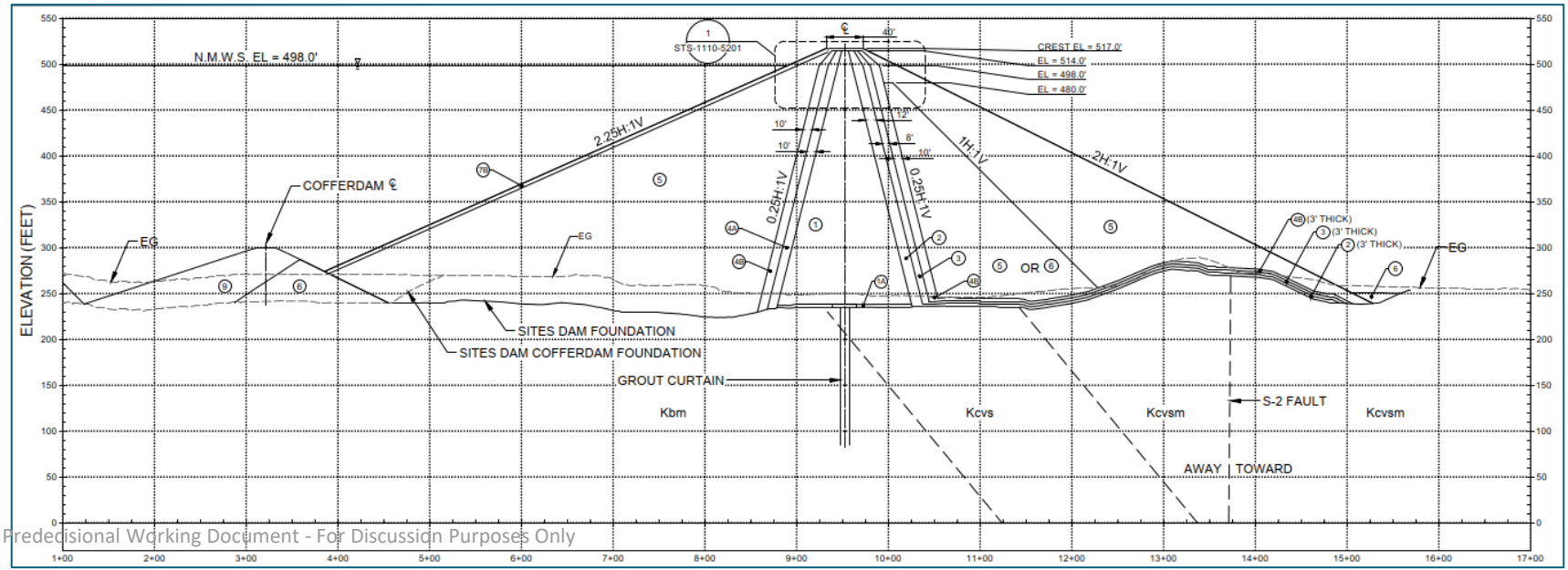
Saddle Dams, Dikes and Spillway
- Dam Section
- Dikes and Spillway

I/O structure

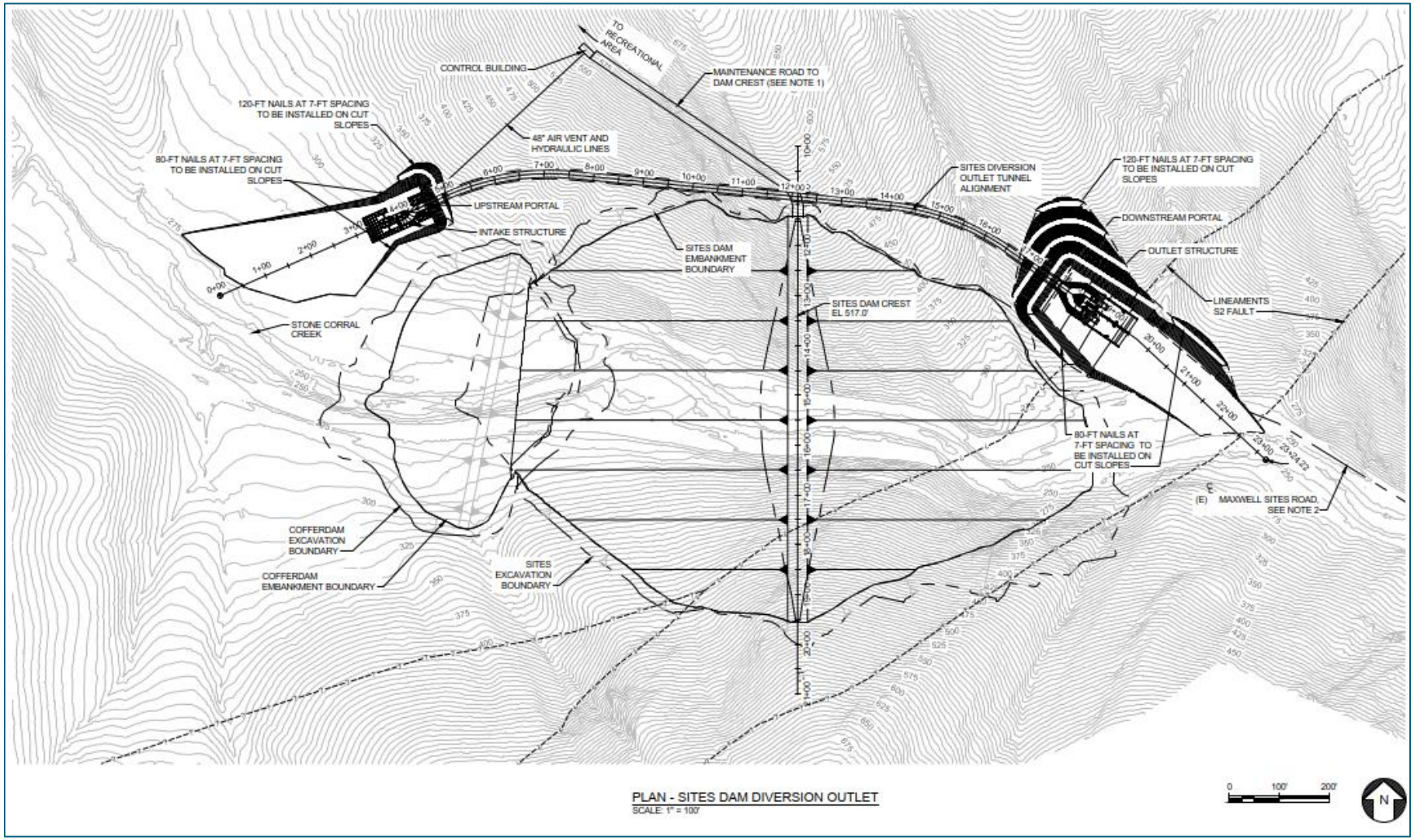
Roads and Bridges

Main Dam Sections

Feature	Feasibility	30%
Crest	30’ width	40’ width
Core	0.5H:1V	0.25H:1V
Chimney	U/S: 30’-thick filter + transition D/S: 30’-thick filter + drain	U/S: 20’-thick transitions (coarse & fine) D/S: 30’-thick filter + drain + transition
Shells	D/S: Random fill	D/S: Rockfill & random rockfill
Cofferdam	150’-wide crest	20’-wide crest, new location

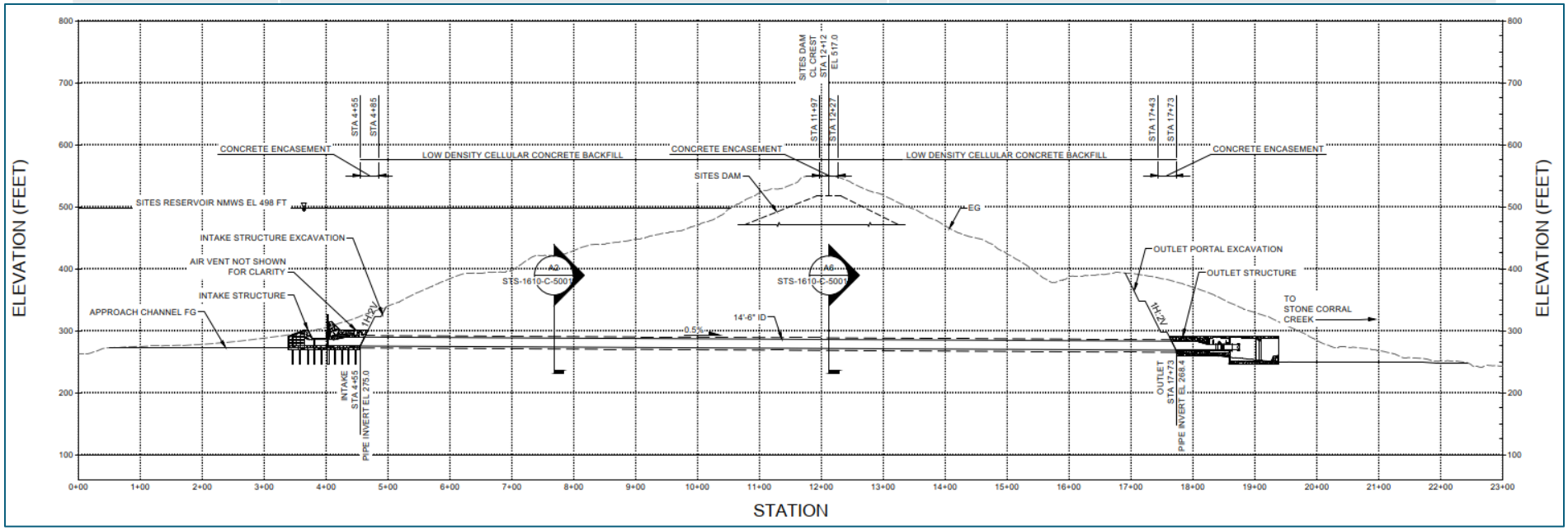


Diversion Structure

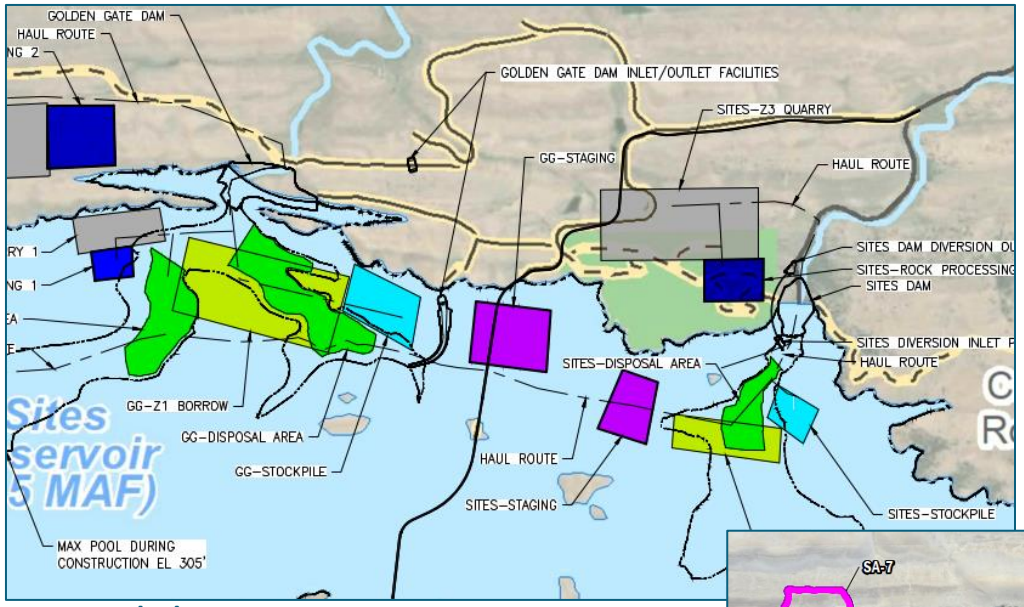


Diversion Structure

Feature	Feasibility	30%
Tunnel	12’ ID conduit. Curved alignment.	14’-6” ID conduit. Straight alignment with bends.
Portals	(Conceptual)	1H:2V cut slopes in rock, reinforced w/ nails



Borrows, Staging, and Stockpile Areas



Key Changes:

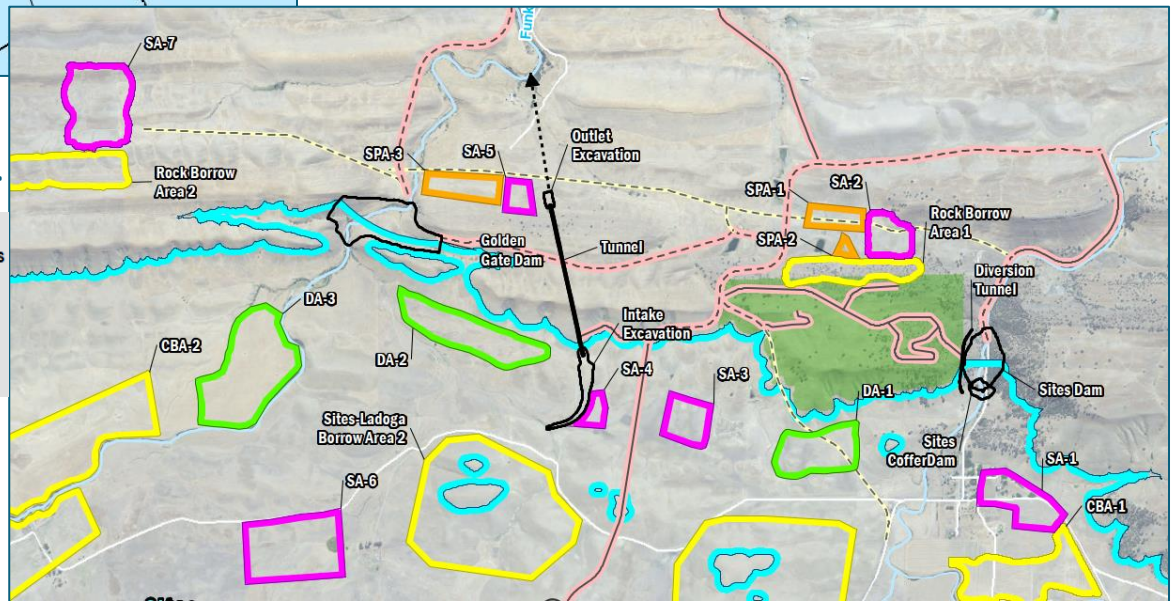
- Core borrows shifted to avoid flood zone.
- Stockpiles moved to downstream and more added.
- Staging areas moved to avoid flood zone and more added.
- Rock borrow layouts updated to optimize geologic conditions.

^ Feasibility

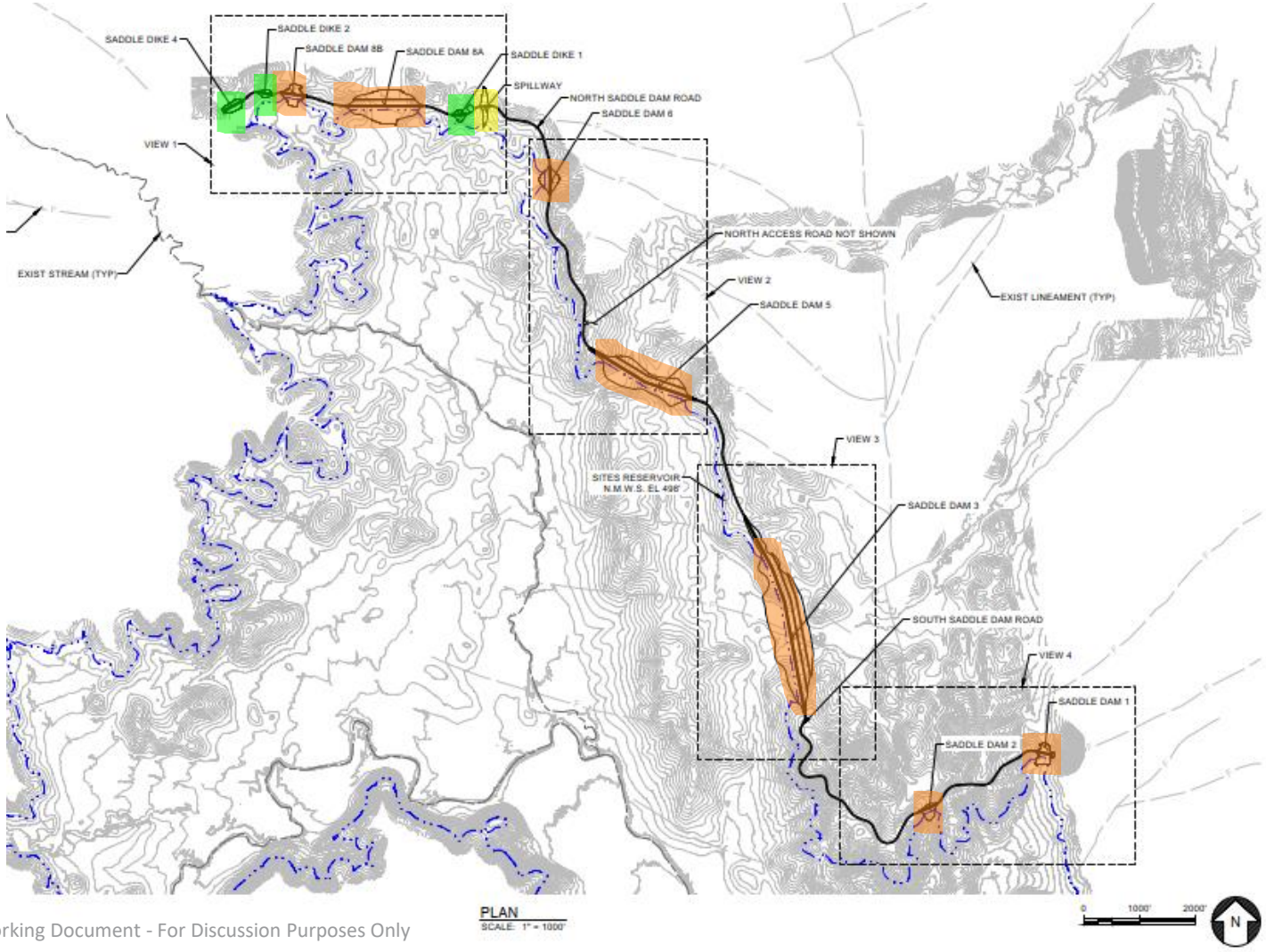
LEGEND
- BORROW AREA
- DISPOSAL AREA
- STAGING AREA
- STOCKPILE AREA
- ROCK PROCESSING AREA
- QUARRY AREA
- HAUL ROUTE

30% >

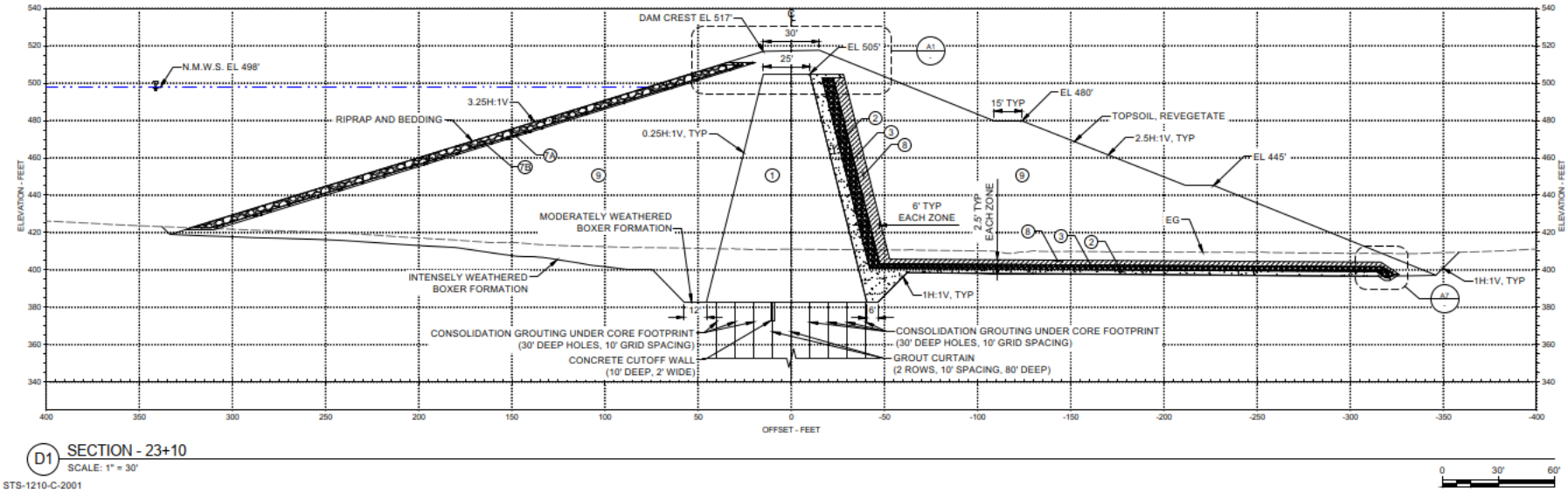
Design Features
- Dam Facility Footprints
- Borrow Area
- Disposal Area
- Staging Area
- Stockpile Area



Saddle Dams



Saddle Dam 3 Section



D1 SECTION - 23+10

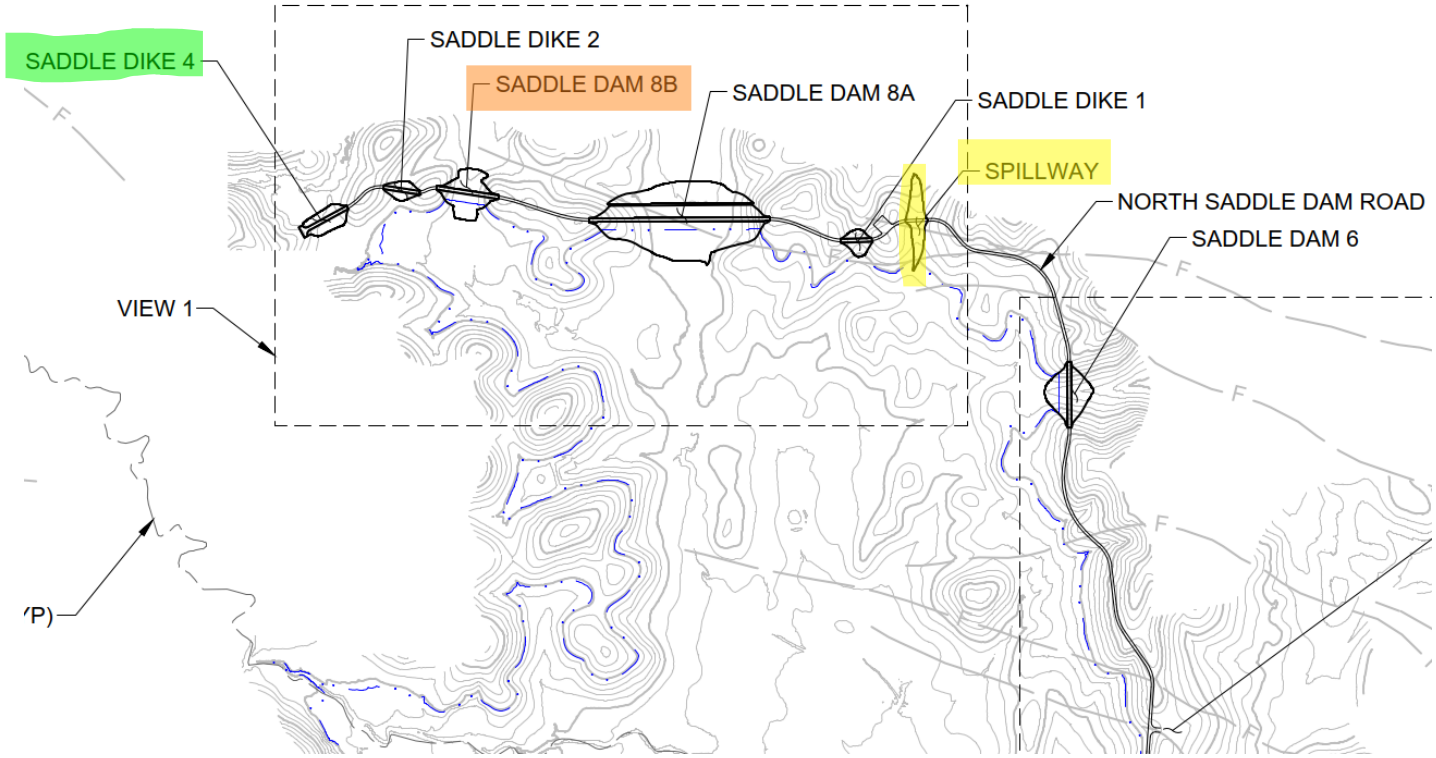
SCALE: 1" = 30'

0 30' 60'

STS-1210-C-2001

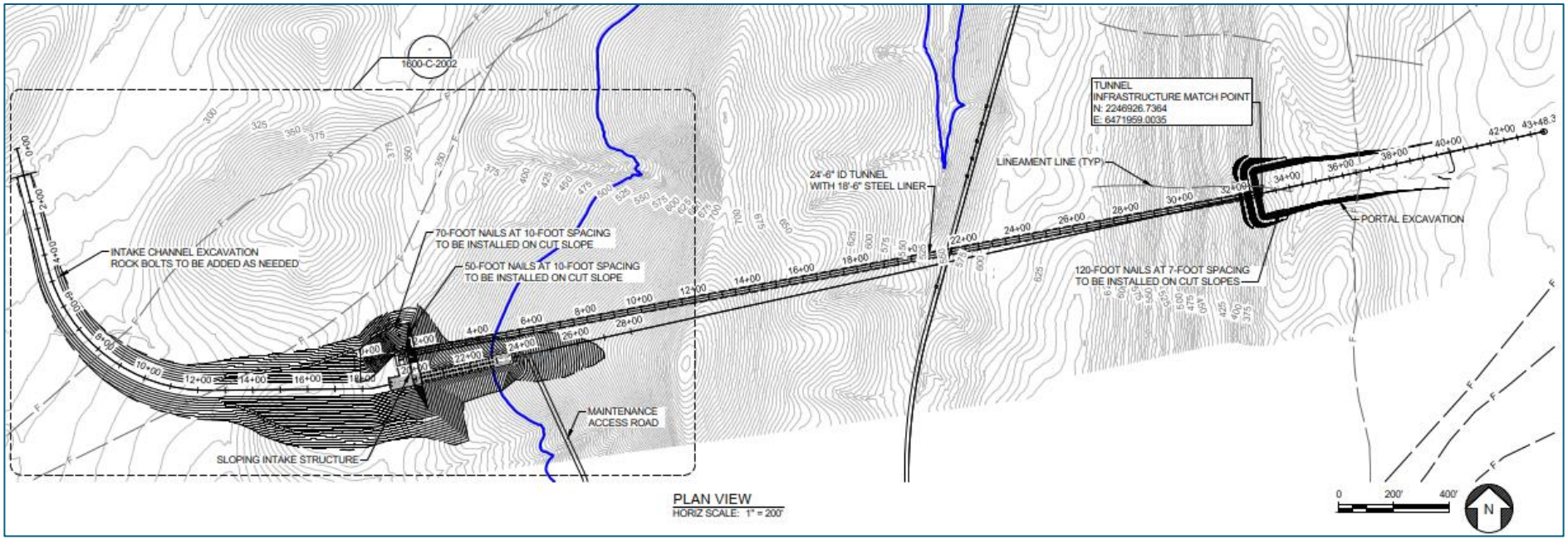
Spillway

Feature	Feasibility	30%
Spillway	Located at Saddle Dam 8B	Located adjacent to Saddle Dike 1. SD8B became earthfill dam.
Saddle Dikes	Saddle Dikes 1 and 2 only	Added Saddle Dike 4

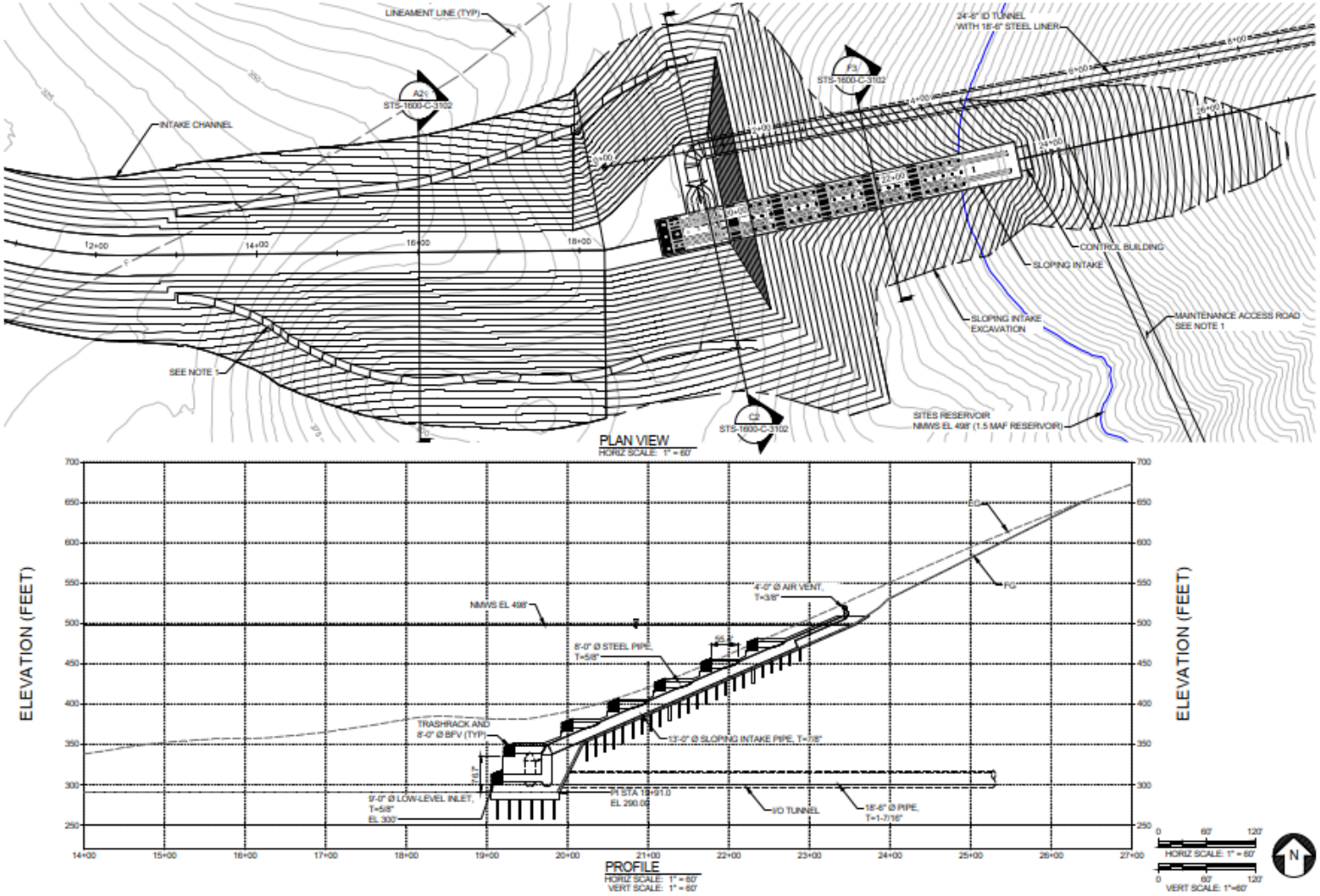


I/O Structure

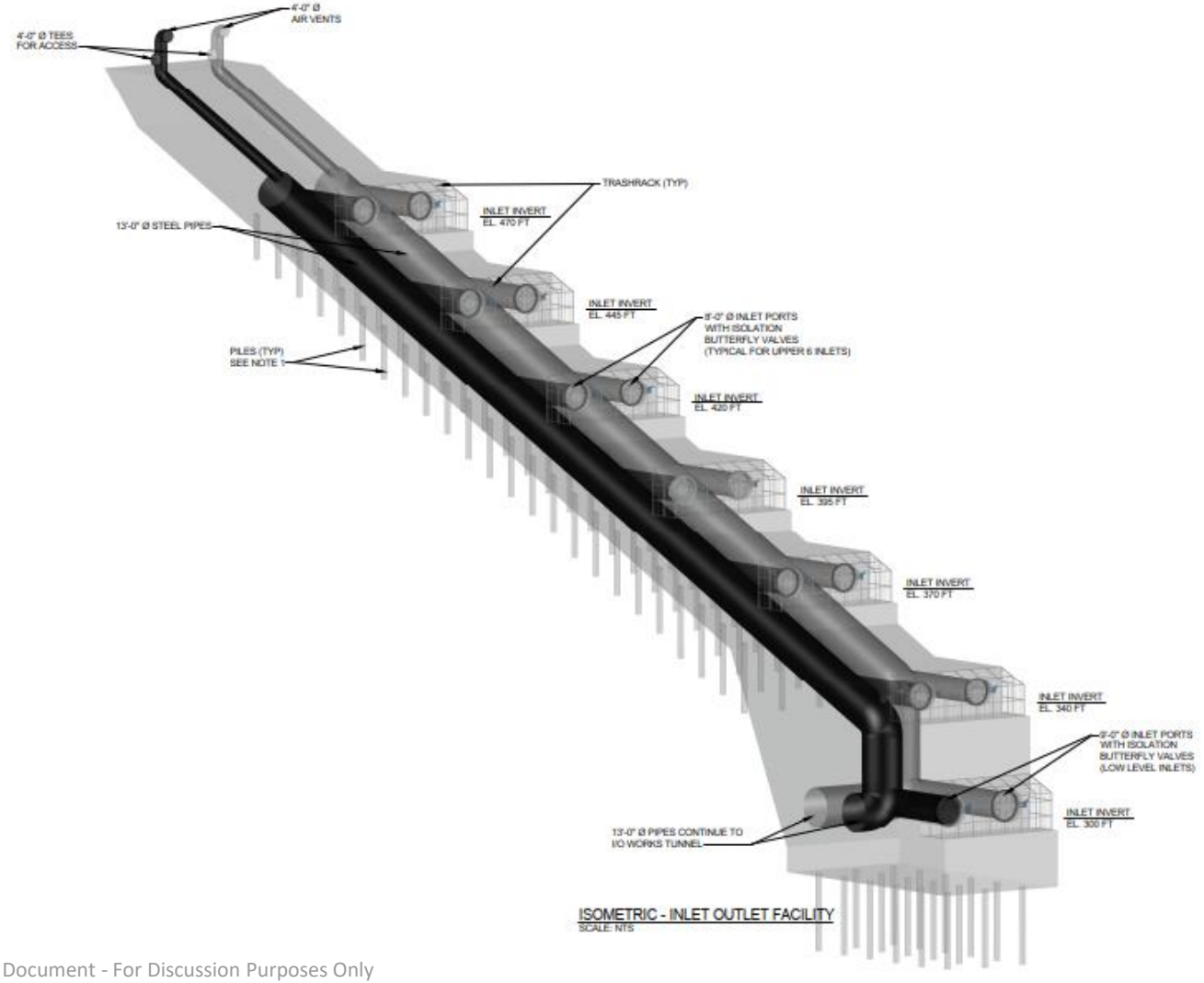
Feature	Feasibility	30%
Tunnel	32’ ID conduit	18’-6” ID conduit
Portal	conceptual	1H:2V cut slopes in rock, reinforced w/ nails



I/O Structure



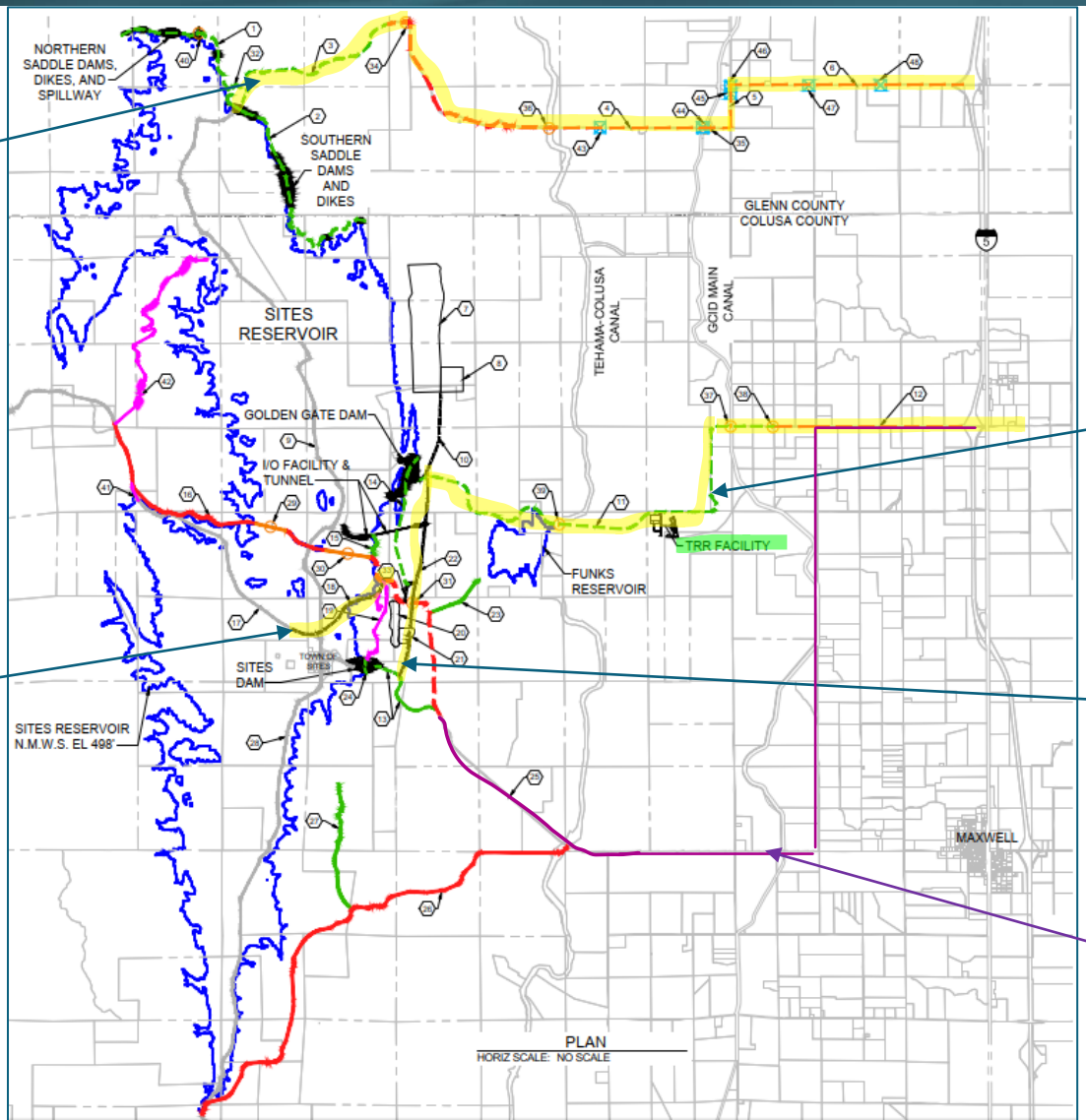
I/O Structure



30% Roads Plan View

Northern Access Road

Sites-Lodoga Detour

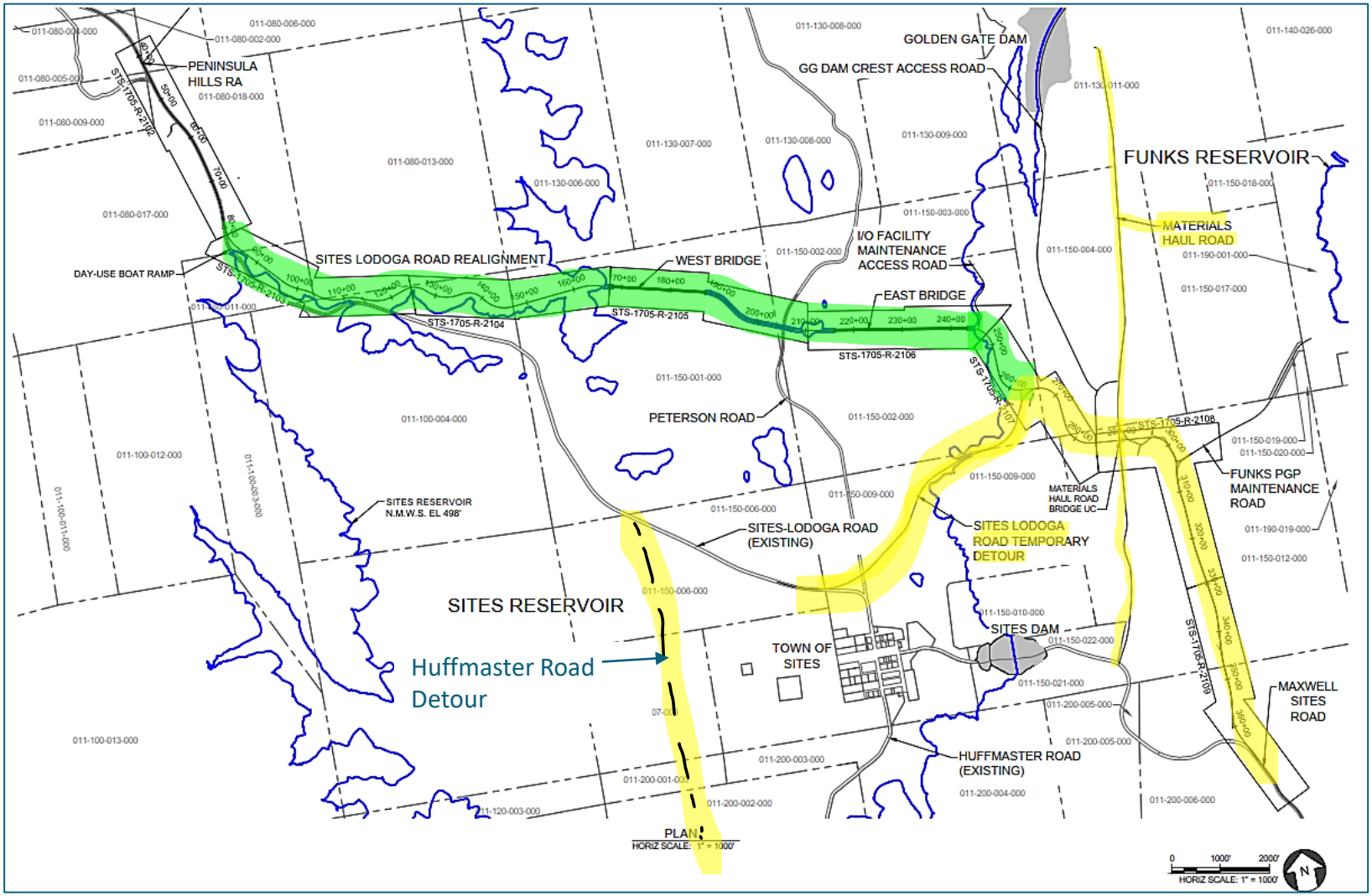


Southern Access Road (Funks Construction Access Road)

North-South Materials Haul Road

OLD Southern Access Road

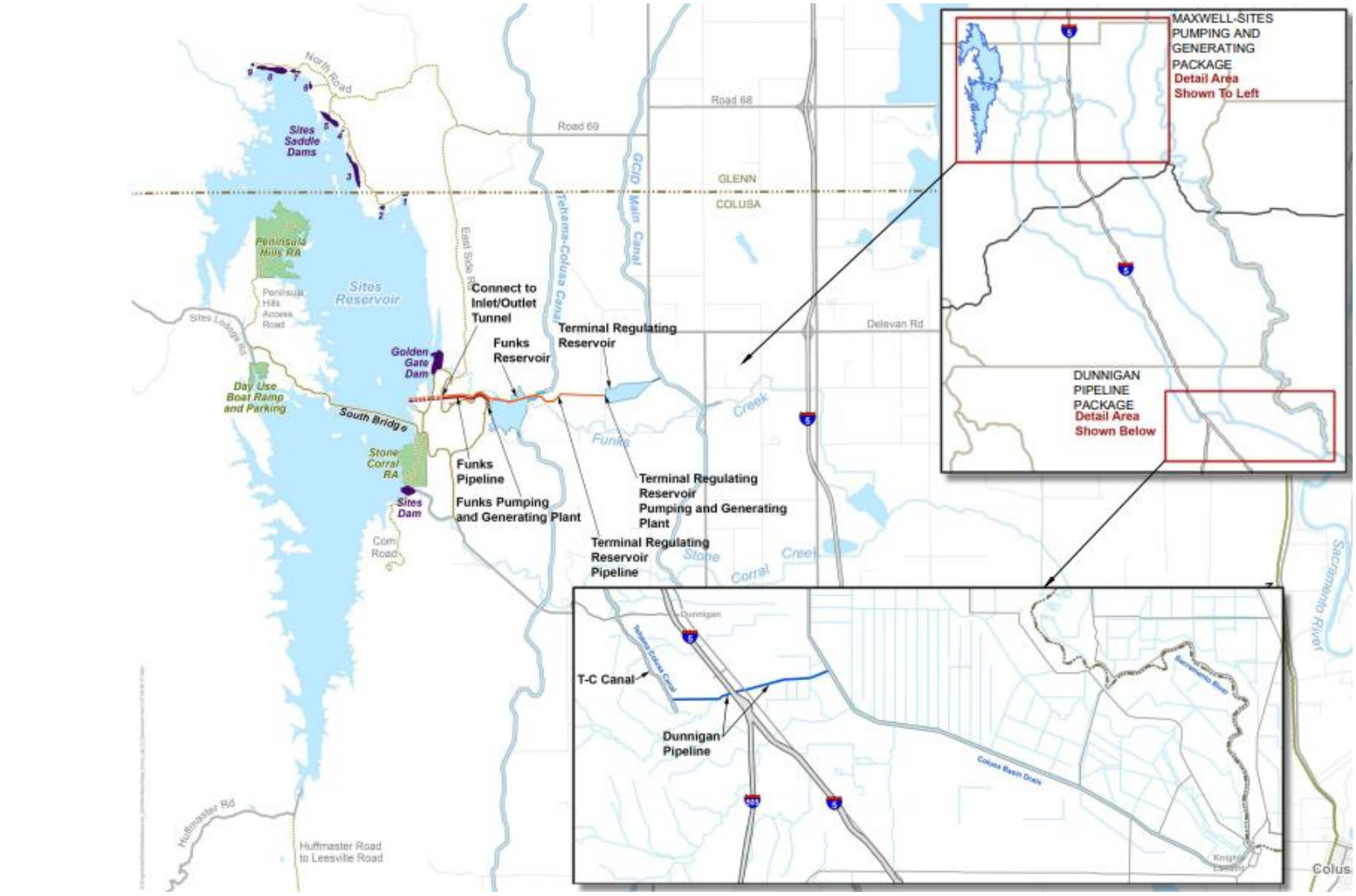
Reservoir Roads (S-L Detour, N/S Haul, Huffmaster)



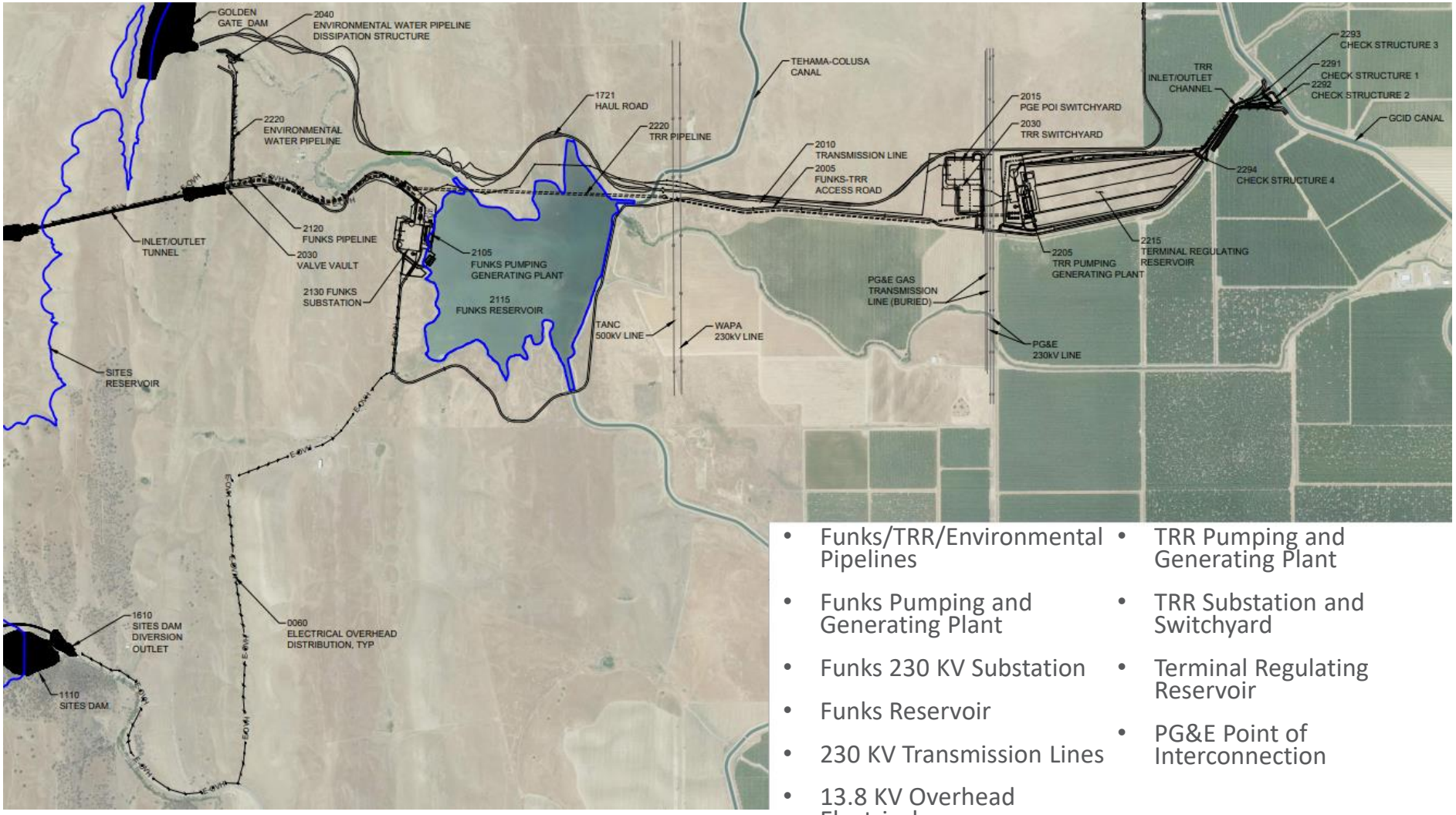
Conveyance Updates:

Funks
TRR
Dunnigan Pipeline

Conveyance Facility Overview



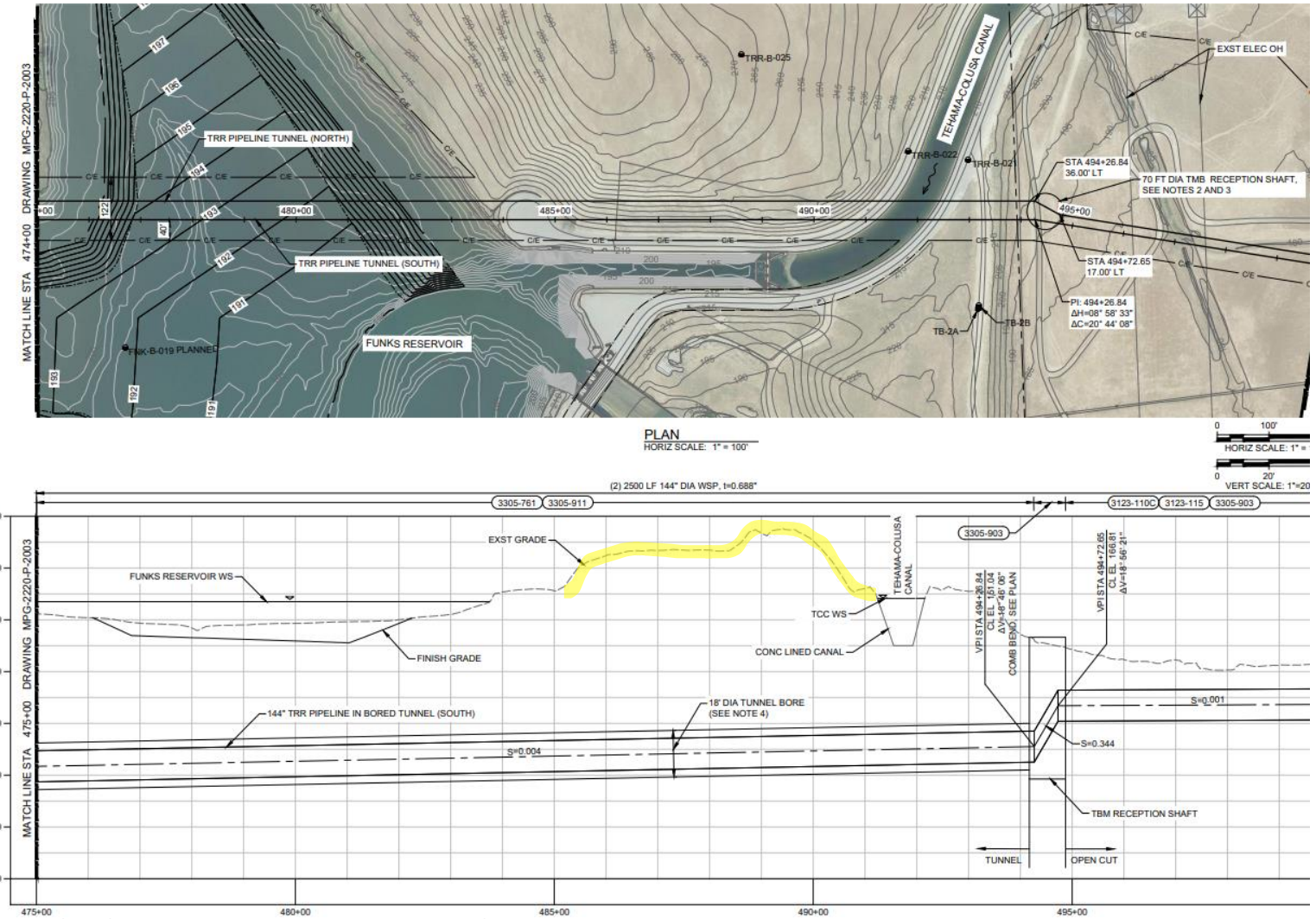
Maxwell Sites Pumping Generating Project (MSPGP) Facility Locations



- Funks/TRR/Environmental Pipelines
- Funks Pumping and Generating Plant
- Funks 230 KV Substation
- Funks Reservoir
- 230 KV Transmission Lines
- 13.8 KV Overhead Electrical
- TRR Pumping and Generating Plant
- TRR Substation and Switchyard
- Terminal Regulating Reservoir
- PG&E Point of Interconnection

TRR Pipeline Tunnel Expansion

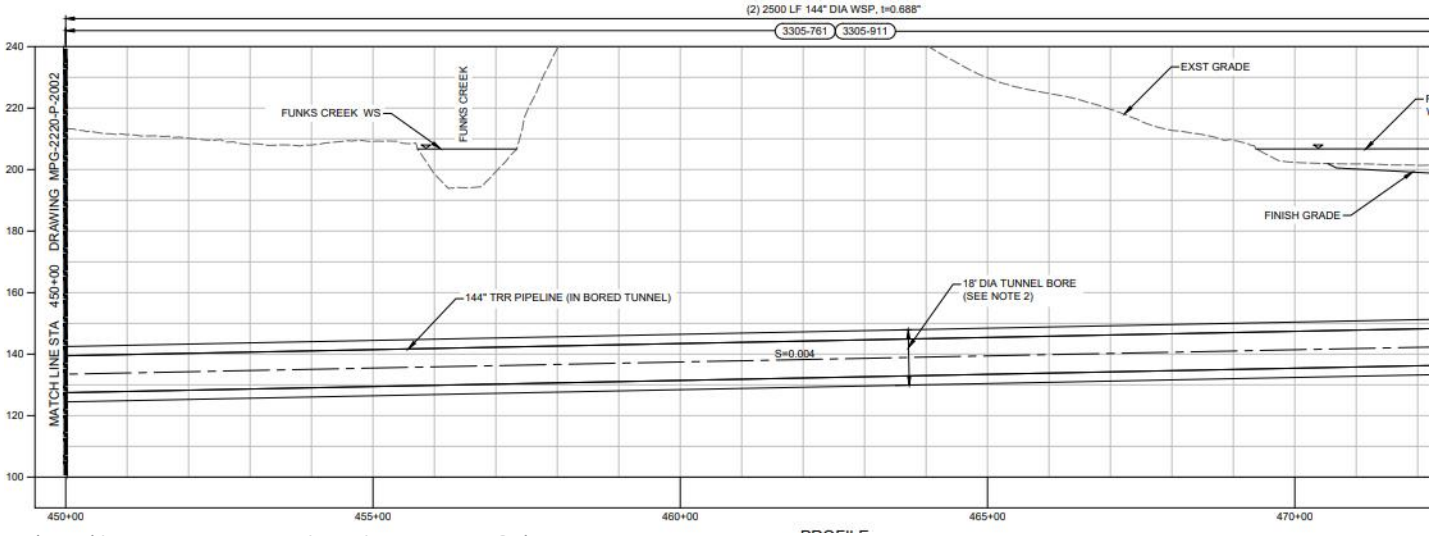
Eliminates substantial hill cut west of TC Canal and extensive cofferdams in Funks Reservoir



TRR Pipeline Tunnel Expansion

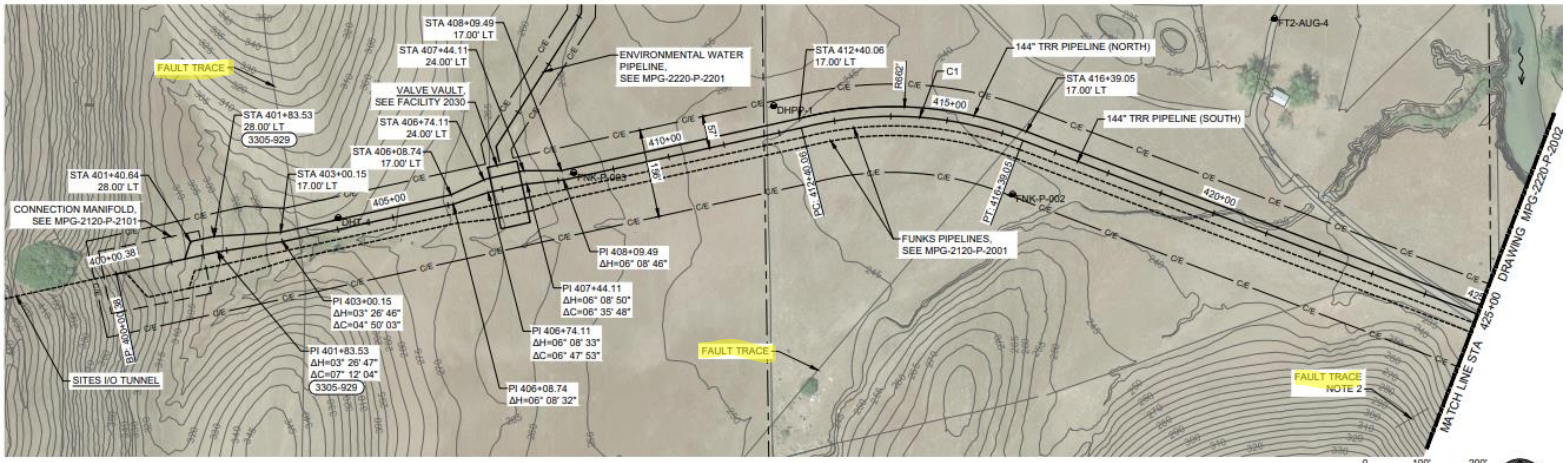
Removes need to divert up to 4,000 cfs (10-yr storm) in Funks Creek during construction

PLAN
HORIZ SCALE: 1" = 100'

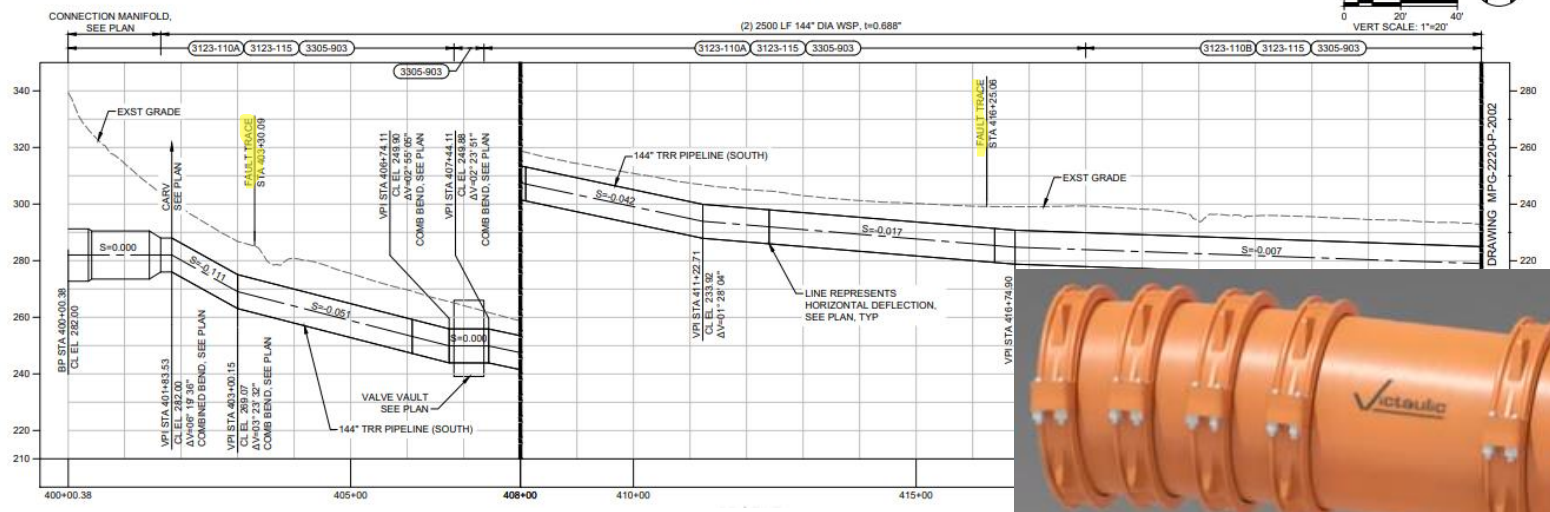


Addition of Seismic Joints

Accommodate for seismic movement at 3 fault traces for four, 12-ft diam DSOD jurisdictional pipelines



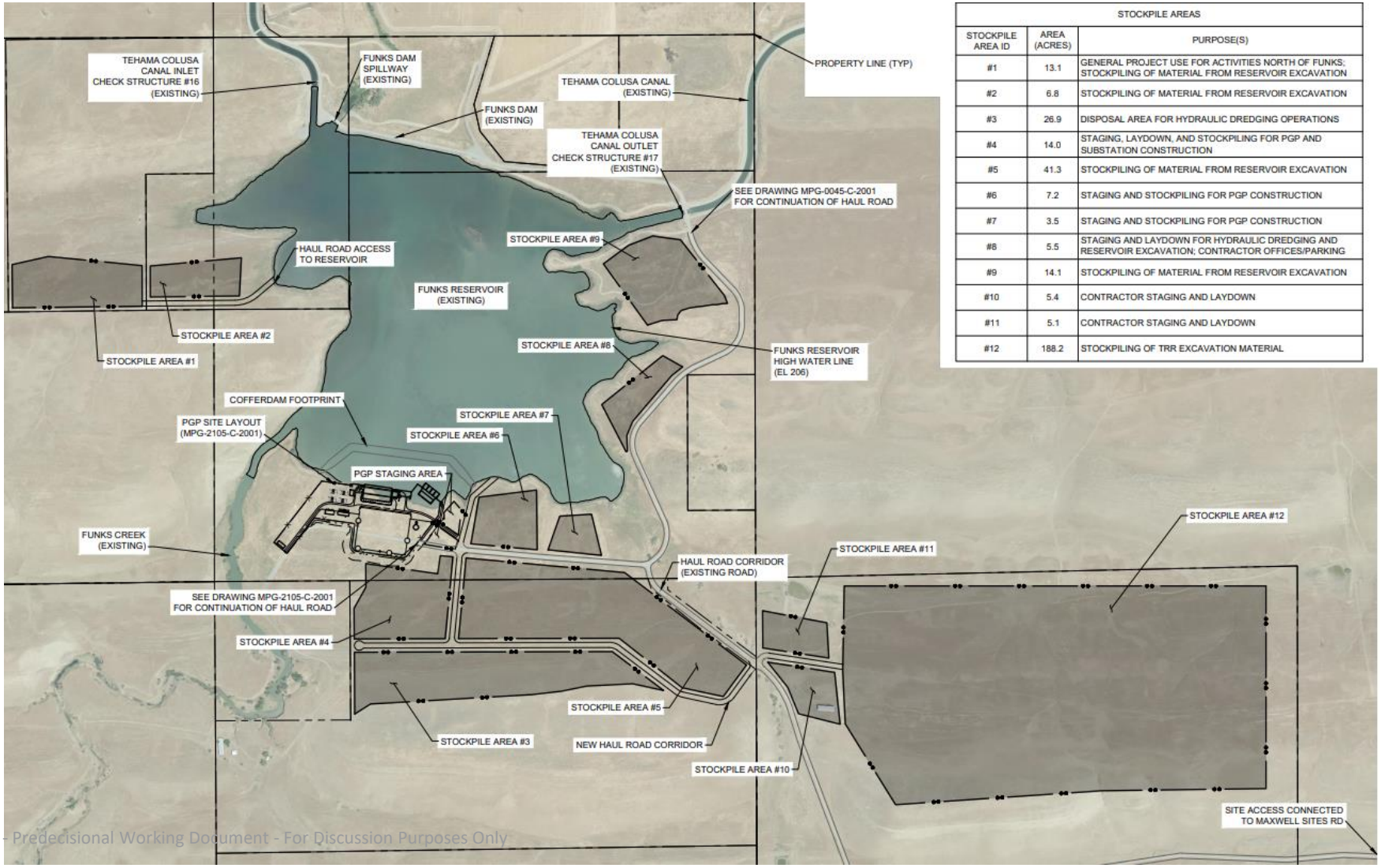
PLAN
HORIZ SCALE: 1" = 100'



HORIZ SCALE: 1" = 100'
VERT SCALE: 1"=20'

Additional Stockpile Areas

Soil Stockpile areas expanded for TRR excavation and Funks reservoir excavation

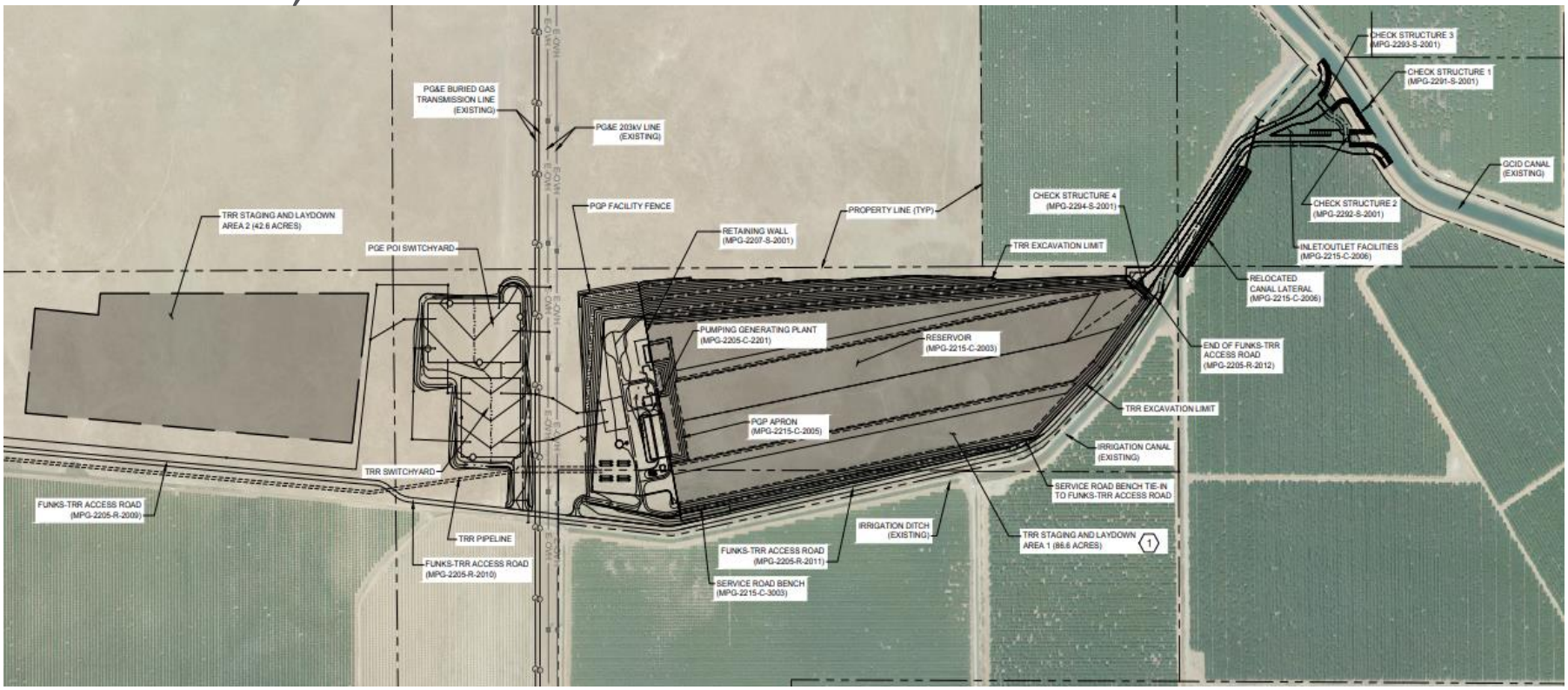


STOCKPILE AREAS		
STOCKPILE AREA ID	AREA (ACRES)	PURPOSE(S)
#1	13.1	GENERAL PROJECT USE FOR ACTIVITIES NORTH OF FUNKS; STOCKPILING OF MATERIAL FROM RESERVOIR EXCAVATION
#2	6.8	STOCKPILING OF MATERIAL FROM RESERVOIR EXCAVATION
#3	26.9	DISPOSAL AREA FOR HYDRAULIC DREDGING OPERATIONS
#4	14.0	STAGING, LAYDOWN, AND STOCKPILING FOR PGP AND SUBSTATION CONSTRUCTION
#5	41.3	STOCKPILING OF MATERIAL FROM RESERVOIR EXCAVATION
#6	7.2	STAGING AND STOCKPILING FOR PGP CONSTRUCTION
#7	3.5	STAGING AND STOCKPILING FOR PGP CONSTRUCTION
#8	5.5	STAGING AND LAYDOWN FOR HYDRAULIC DREDGING AND RESERVOIR EXCAVATION; CONTRACTOR OFFICES/PARKING
#9	14.1	STOCKPILING OF MATERIAL FROM RESERVOIR EXCAVATION
#10	5.4	CONTRACTOR STAGING AND LAYDOWN
#11	5.1	CONTRACTOR STAGING AND LAYDOWN
#12	188.2	STOCKPILING OF TRR EXCAVATION MATERIAL

Reduced TRR to One Cell

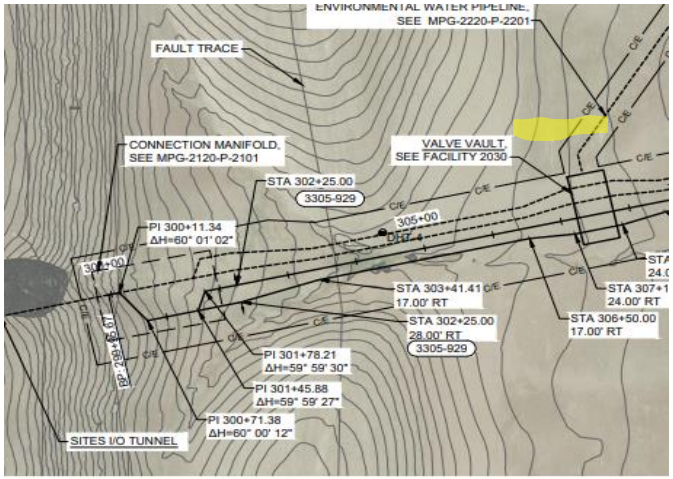
Hydraulic modeling confirmed size (600-ac-ft) was needed to accommodate GCID operations

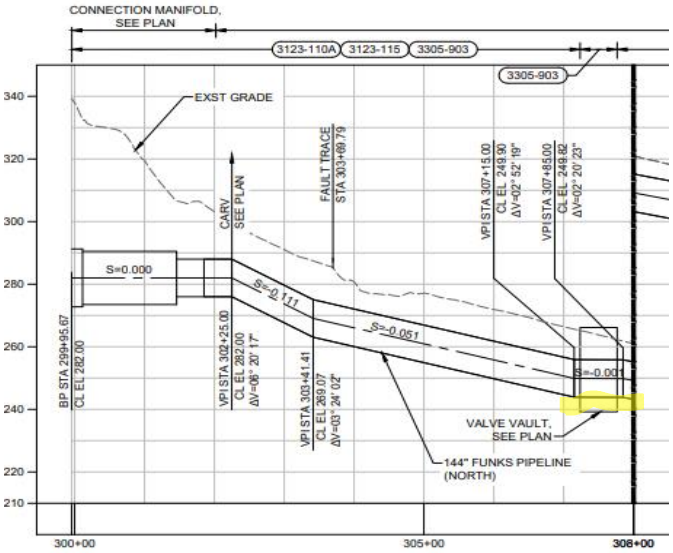
- Reduced excavation volume by about 3 million cubic yards
- Added 2,600 LF to both TRR pipelines including 500' of tunneling under PG&E gas lines
- Added 2,400 LF of 230-KV transmission lines

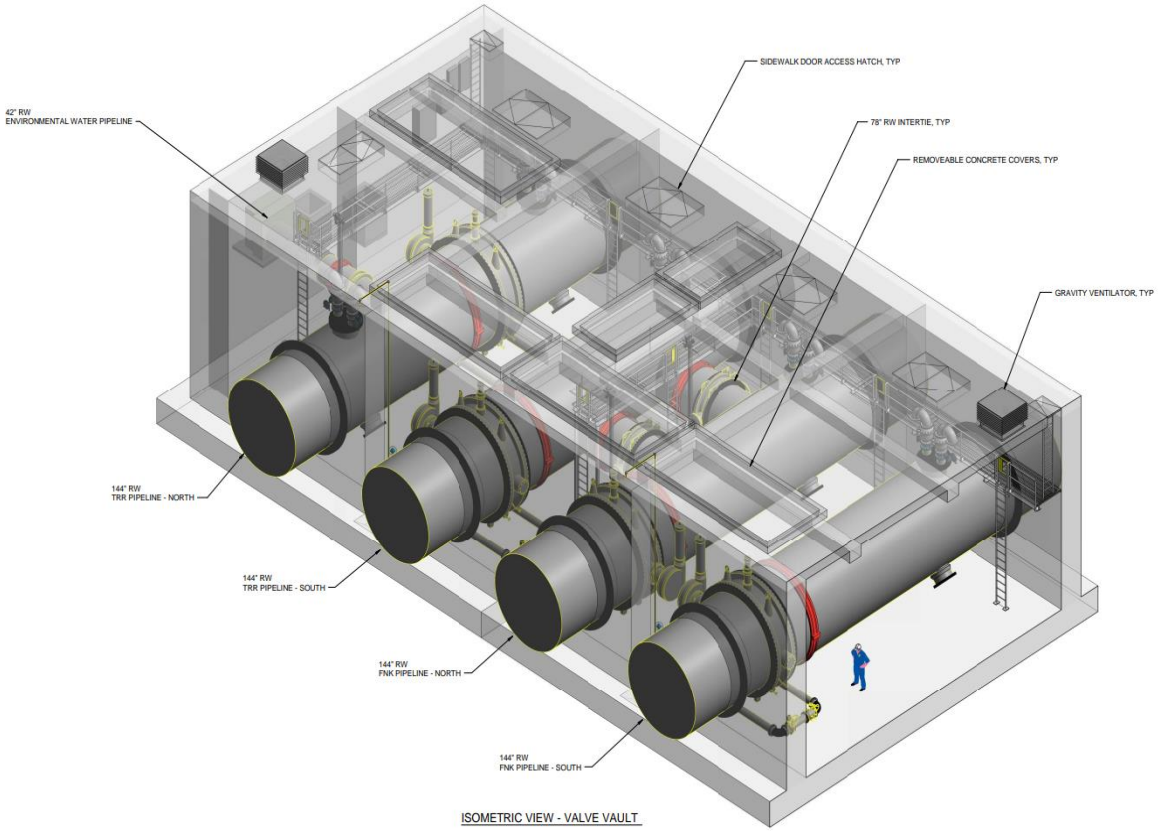


New and Expanded Facilities

Valve vault added to house isolation valves for TRR and Funks pipelines and Maxwell Intertie

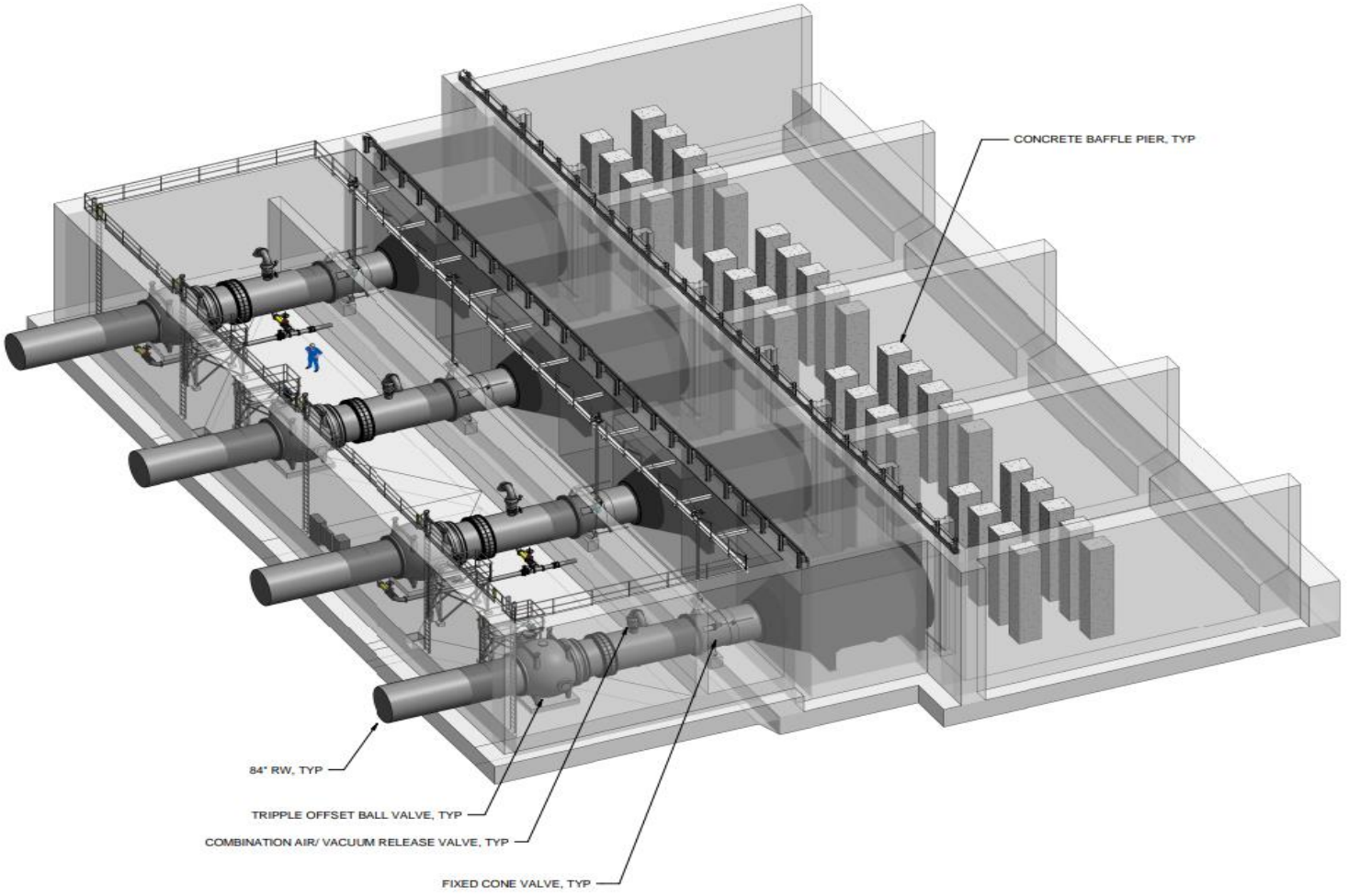






New and Expanded Facilities

Energy dissipation structures sized for emergency drawdown flows at 30% (8,200 + 1,000 cfs) vs operational flows at 10% (3,000 cfs)



ISOMETRIC - EMERGENCY DISSIPATION STRUCTURE

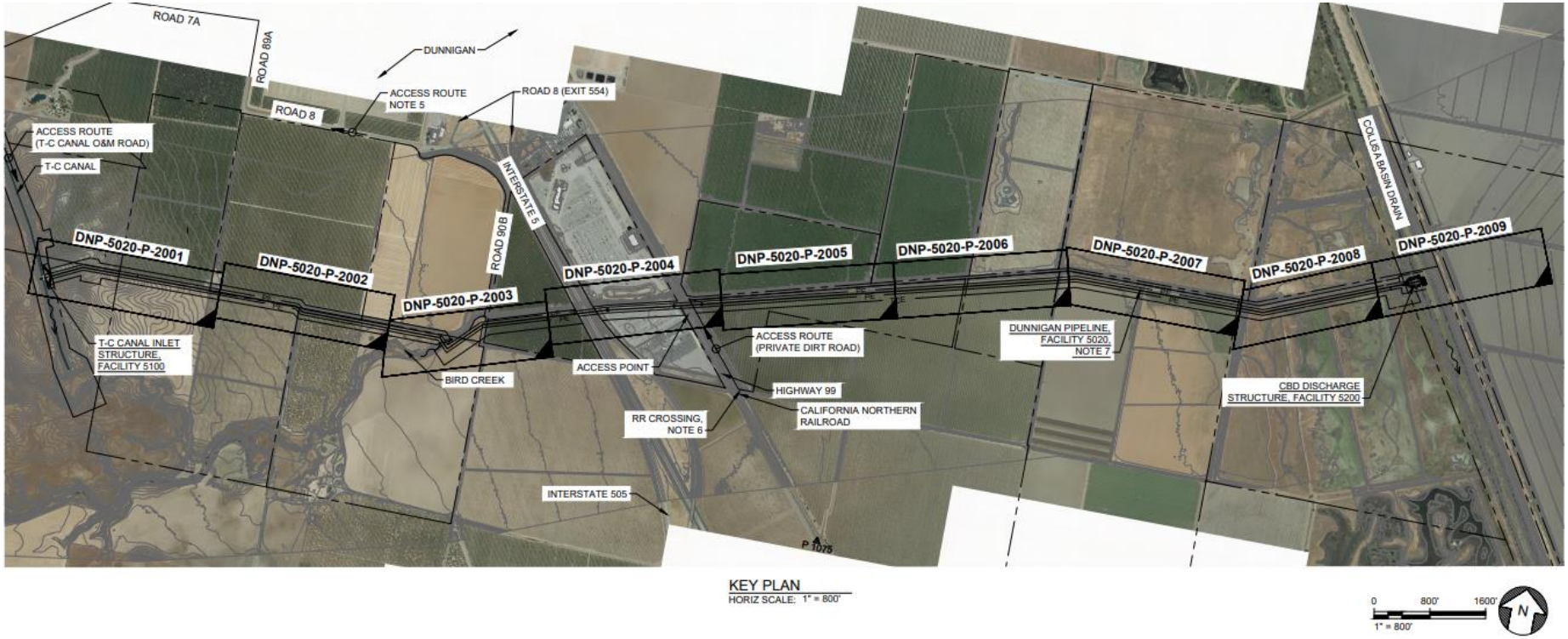
New and Expanded Facilities

Additional Facilities at Funks Pumping and Generating Plant

New and Expanded Facilities

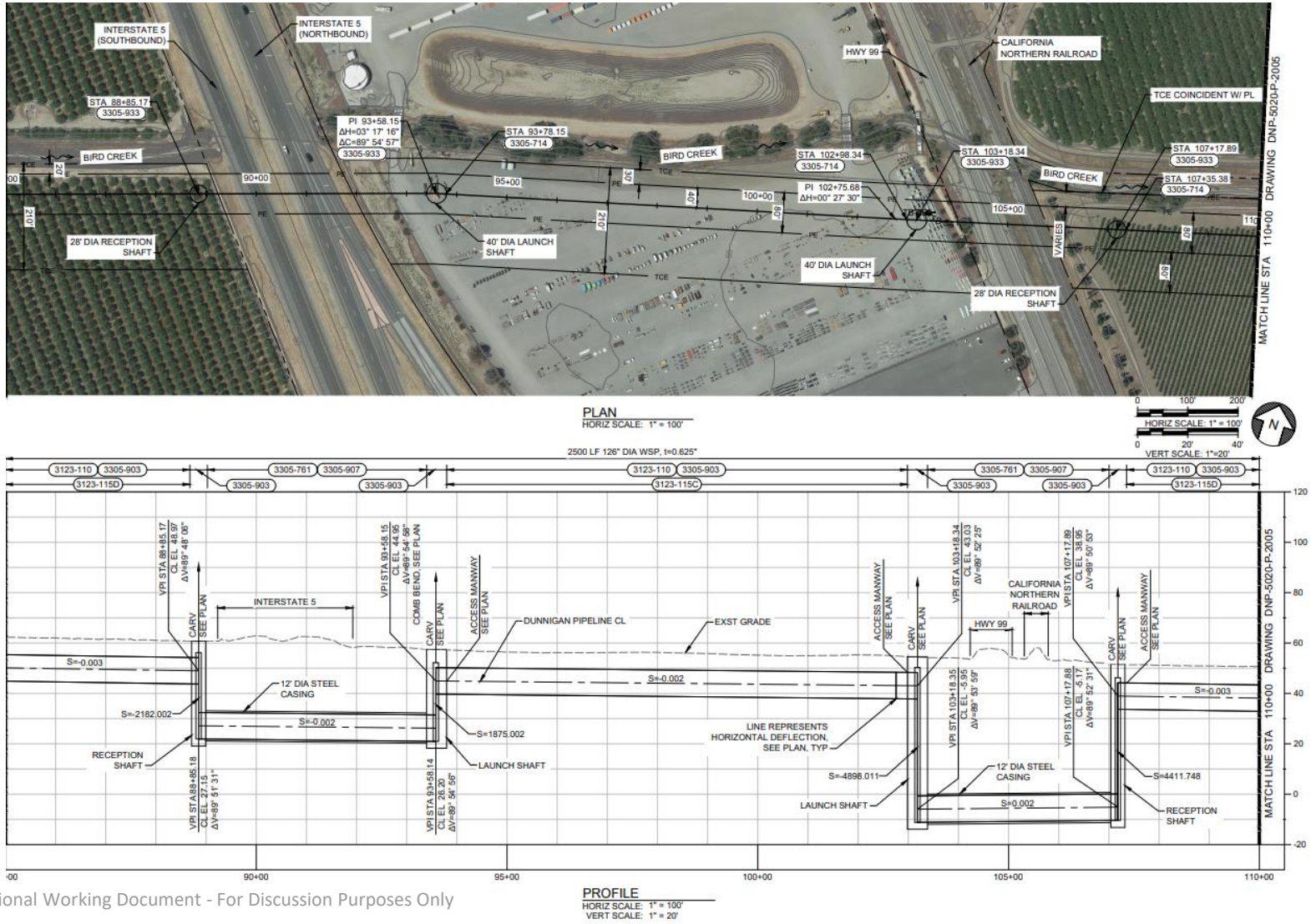
Additional Facilities at TRR Pumping and Generating Plant

Dunnigan Pipeline Project (DNP) Overall Facility Locations



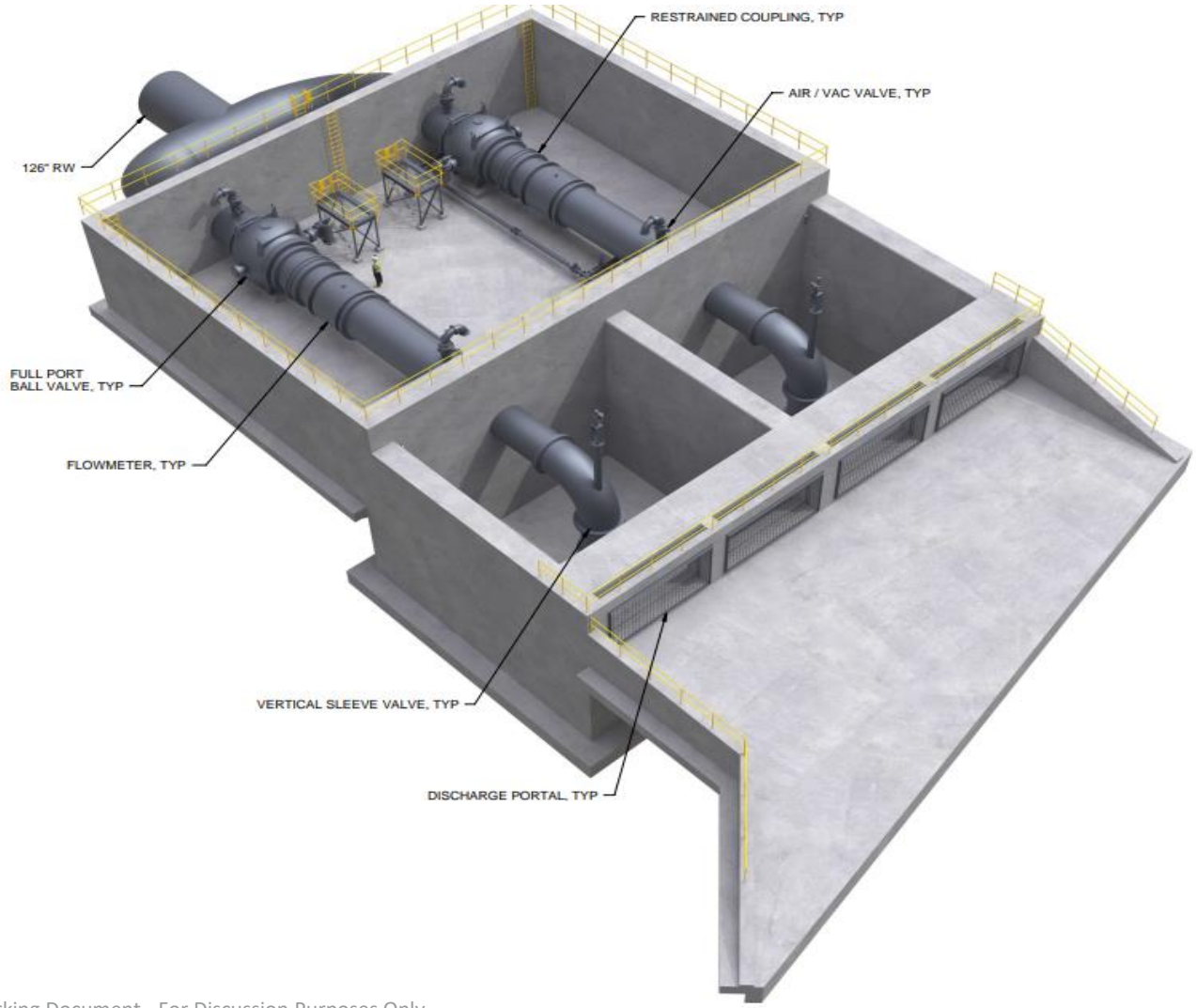
New and Expanded Facilities

Dunnigan pipeline hydraulics confirm increase pipe from 9.5' to 10.5', including enlarged tunnel under I-5, HWY 99 and railroad



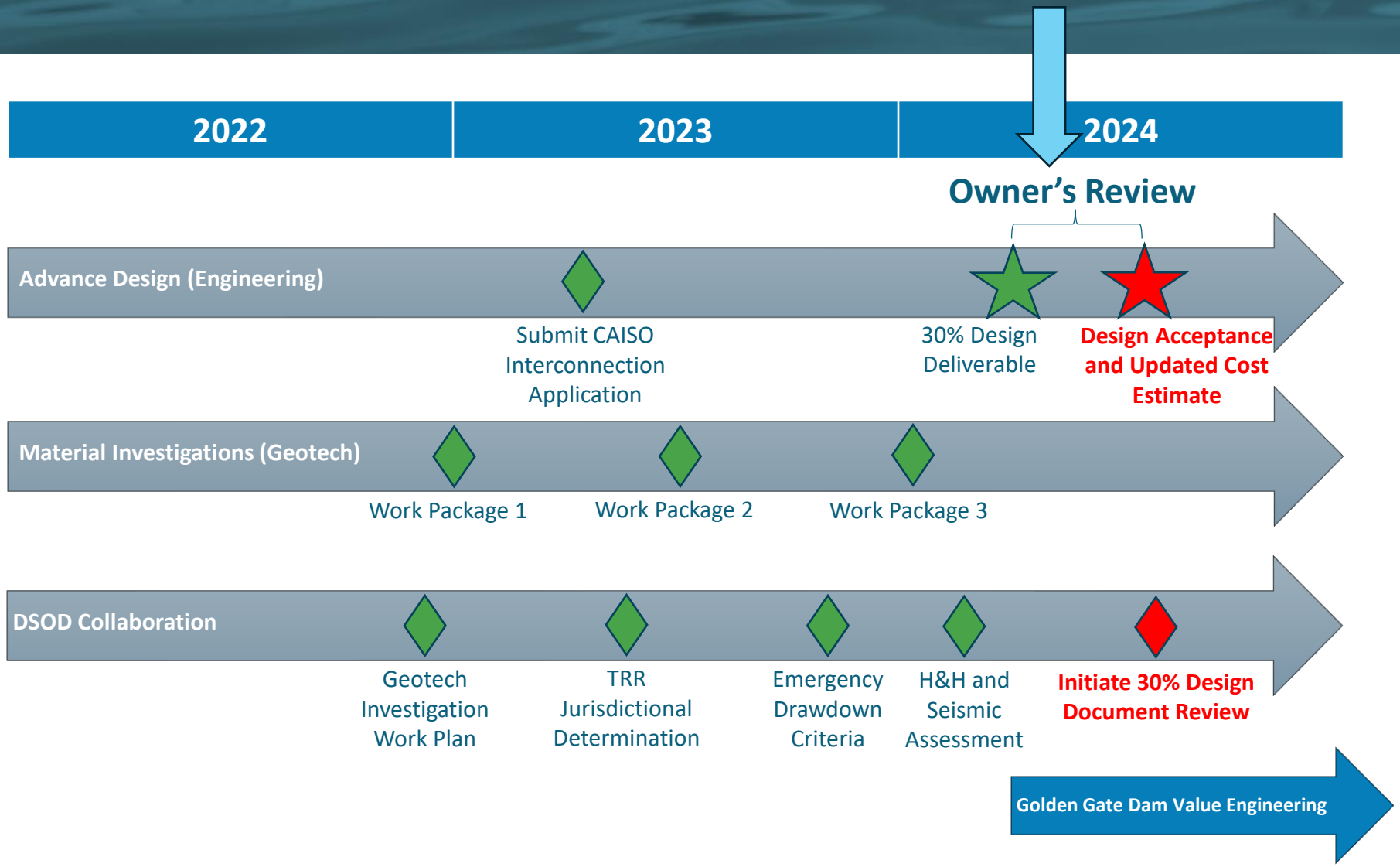
New and Expanded Facilities

Dunnigan pipeline discharge structure expanded to accommodate full range of discharge flows (50 - 1000 cfs)

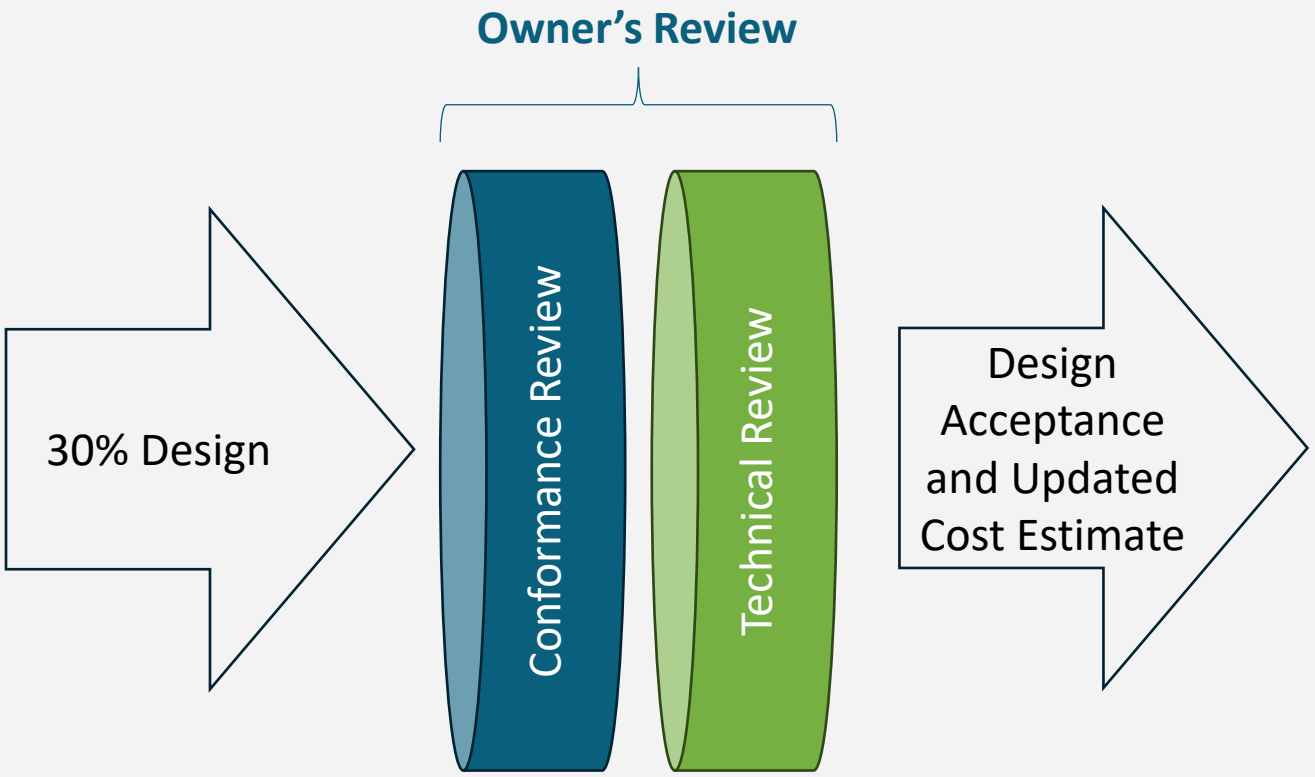


Owner’s Review

Next Steps


2022
2023
2024
Owner's Review
Advance Design (Engineering)
Submit CAISO Interconnection Application
30% Design Deliverable
Design Acceptance and Updated Cost Estimate
Material Investigations (Geotech)
Work Package 1
Work Package 2
Work Package 3
DSOD Collaboration
Geotech Investigation Work Plan
TRR Jurisdictional Determination
Emergency Drawdown Criteria
H&H and Seismic Assessment
Initiate 30% Design Document Review
Golden Gate Dam Value Engineering

Owner's Review Process



Investor Commitment

Owner's Design Review Components

Conformance Review

All Project features

- Documentation, coordination, alignment to design direction, overall advancement of design
- Confirmation design includes program elements and features

Technical Review

Golden Gate Dam

- Validate 30% design criteria and analyses
- Alignment with DSOD Strategy
- Focused, advancing design to the next milestone (60%)

Design Acceptance

- **Engineering & Construction Manager**
  - **Evaluate Comments**
    - Carry forward as part of design progression towards the next design milestone or Address comment(s) prior to costing
    - ***Conditional upon acceptance of future comprehensive environmental compliance review(s)***
  - **Design Acceptance**
    - Accept designs as basis of the Updated Cost Estimate
    - Baseline for future design phases
    - Milestone advancement of design

Questions?

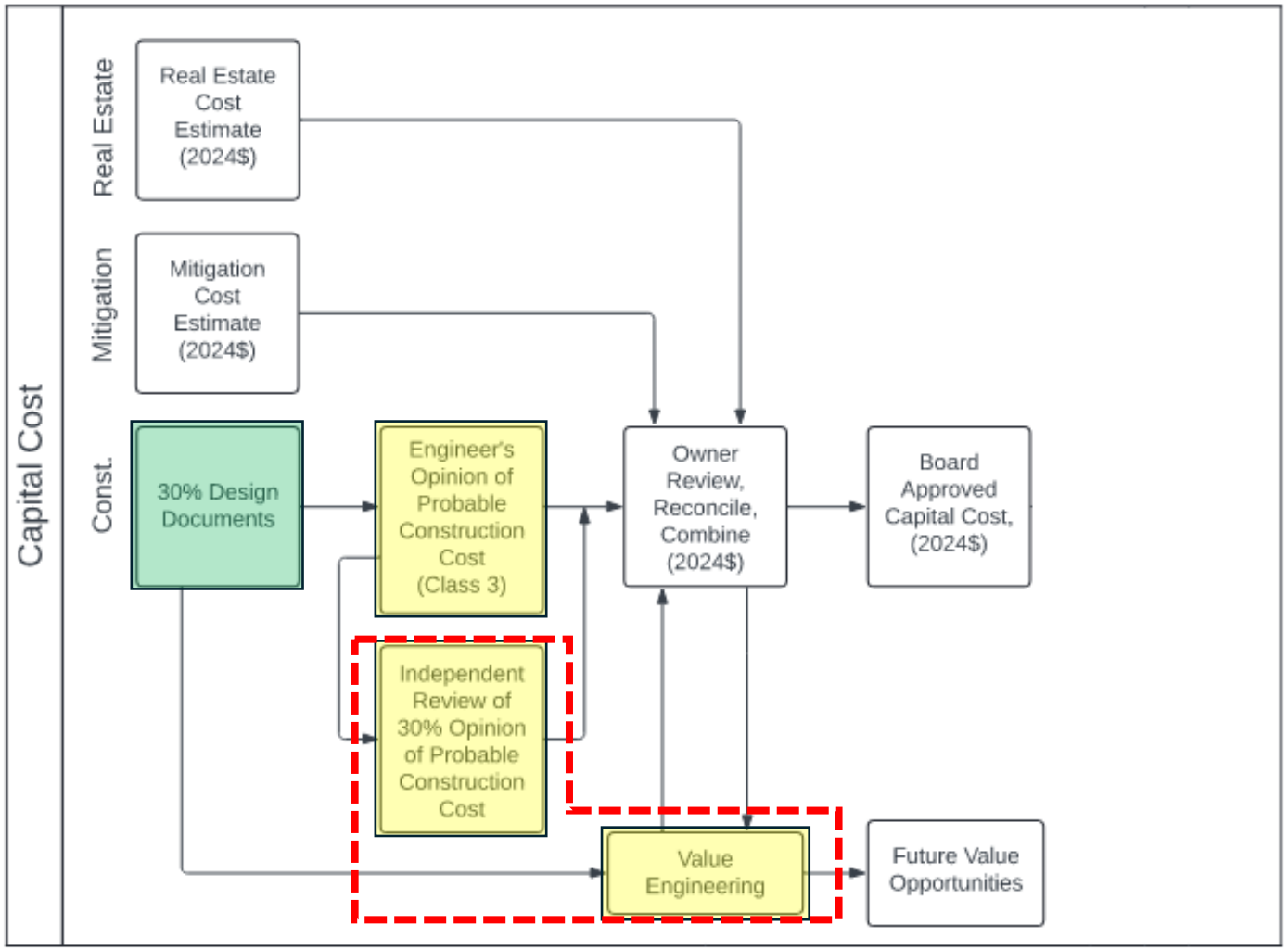
Agenda Item 1.3

Review Assumptions related to the independent cost estimate review and value engineering considerations

JP Robinette

Sites

Capital Cost Estimate Development



OPCC Independent Review and Value Engineering

- Activities to confirm:
  - the cost estimate is reasonable and complete
  - value engineering options are considered and, if applicable, cost-saving measures are applied

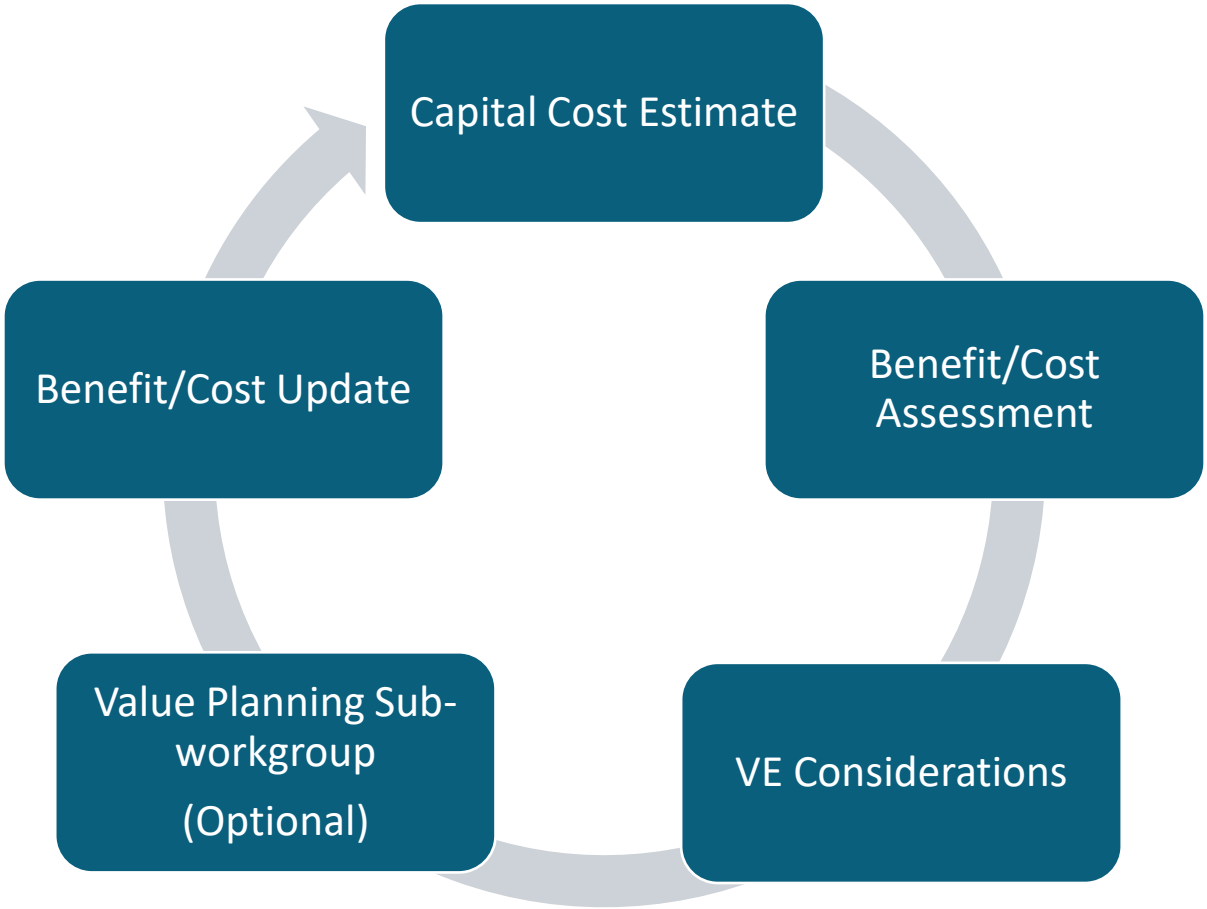
Goal: to verify and ensure transparency of assumptions and considerations in development of the updated cost estimate

OPCC Independent Review

- Verify appropriate quantity takeoffs and direct cost applications
- Validate indirect cost assumptions:
  - Markups
  - Contingencies
  - Escalation

MWD, with help from a bench of independent cost estimating experts, will be performing the 30% Design OPCC Independent Review

Value Engineering



Questions?

Engineering and Construction Manager's Report

JP Robinette

Sites

Action Items

#	Action Item	Status
1	Provide briefing on power strategy and considerations (CAISO, PG&E, PWRPA, WAPA)	Future workgroup item (Jul 2024)
2	Provide update on DSOD review and feedback on technical information that has been submitted	Future workgroup item (Dec 2024/Jan 2025)
3	Provide geotechnical data assessment (Golden Gate Dam VE)	Future workgroup item (Nov 2024)
4	Provide update on CalSim3 Modeling	Future workgroup item (TBD)
5		

Future Topics

- Review assumptions and considerations related to the in-progress Class 3 cost estimate.
- Review initial Policy and Procedure for rate setting for use of downstream facilities a) between Sites Participants and b) outside of Sites Participants
- Recommend release of CMAR RFQ
- **Others?**

Questions?

Thank you!

Next Meeting:

Wednesday, July 10, 2024 (1:30 pm – 3:30 pm)

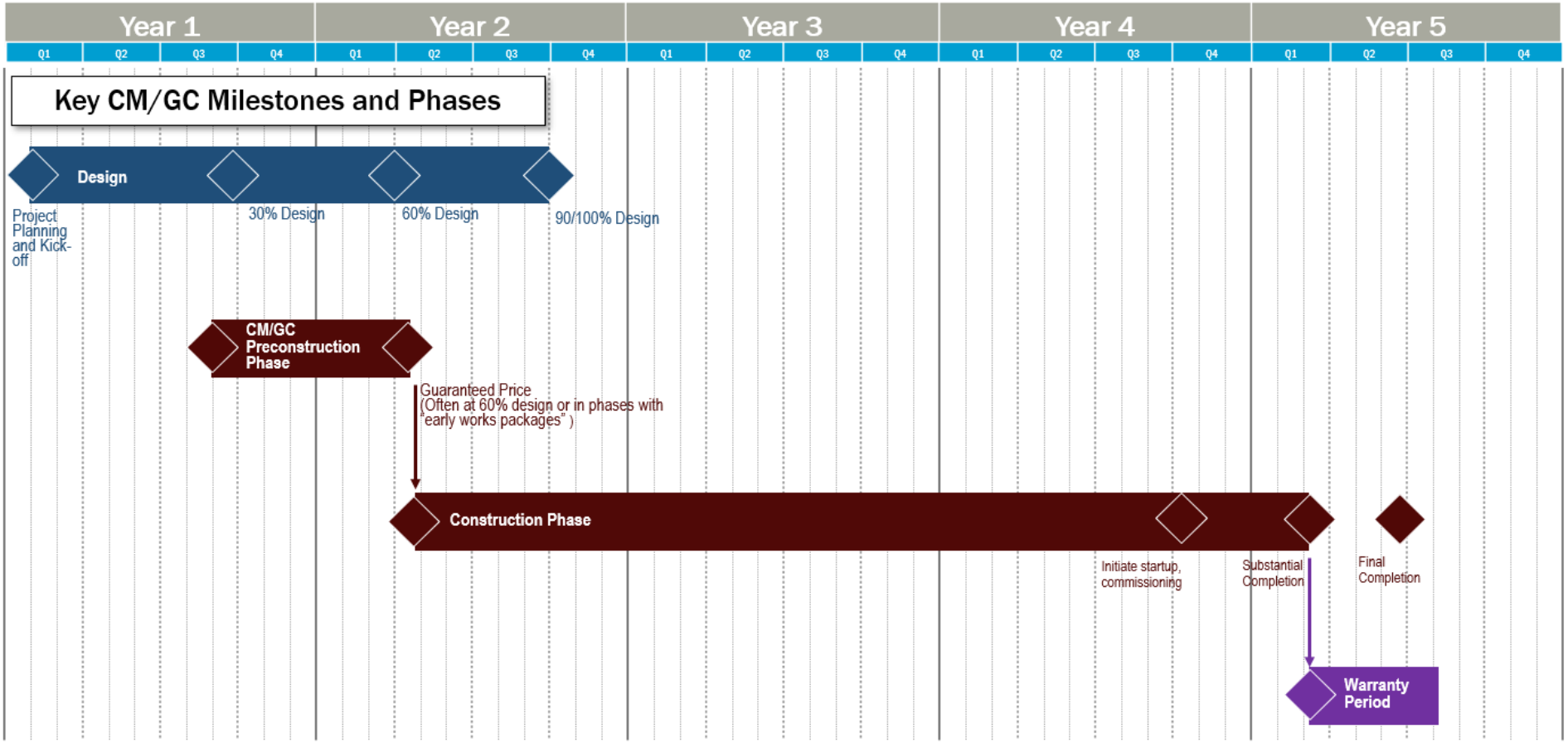
Additional Information

CMAR Primary Attributes

Project Schedule

- Can be delivered faster than traditional DBB because construction may be initiated prior to 100% design completion.
- Construction authorized once agreement on scope, schedule, contingency, and price are achieved.
- Design and construction do not have to be sequential unless required by permitting/regulatory requirements).
- Construction of some elements of the work may start after mutual agreement on price for those elements. The owner doesn't have to wait until completion of 100 percent design for the entire project.

“Typical” CMAR Schedule Milestones



Principal Benefits of CMAR Delivery

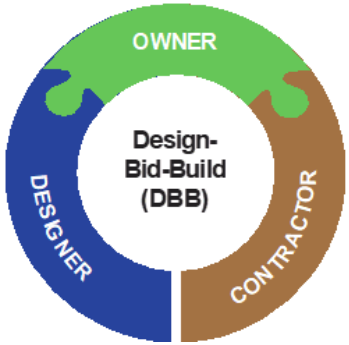
Principal Benefits:

- ✓ Ability to do investigations during preconstruction to support design and cost estimating efforts.
- ✓ Open book pricing for construction cost.
- ✓ Fees (OH/Profit) for construction provided during procurement under competitive tension (if allowed).
- ✓ Select contractor on qualifications and limited pricing information (not low bid).
- ✓ Benefit of negotiating scope/pricing with CMGC who has expertise in type of construction, and open book pricing results in high degree of confidence.

Challenges (shared with DBB):

- No single point of accountability
  - Engineering responsibility is limited by Standard of Care.
  - Construction Contractors are only obligated to build the plans they are given
  - Performance Accountability Gap: No party is fully accountable for performance
- Owner is still 'in the middle' of any disputes.

CMAR Delivery
Primary Differences from DBB



Two separate contracts and separate deliverables	Two separate contracts; coordinated deliverables
Proven and familiar delivery method, but known challenges to success (low-bid, constructability of design)	Familiar contract structure that introduces collaboration between designer and contractor to mitigate challenges
Owner “owns” delivery issues	Owner “owns” delivery issues, but mitigates challenges through early collaboration with CMAR and designer
Linear schedule for design and construction	Potential for accelerated schedule
Contractor does not provide input to the design (professional services) during the design phase	Contractor provides input to the design during design phase
Lump sum bid for construction	Open book cost estimating results in a guaranteed maximum price for construction (during design phase), with potential for shared savings

CMAR Contract Highlights
Key Contract Terms – Phase 1 Preconstruction

- Expectations for Phase 2 Construction Contract
- Duty to Cooperate with Owner and Engineer
- Standards for Cost Modelling
  - Locking down the model
  - Granularity
  - Cost of Work vs General Conditions and Overhead
  - Application of Overhead and Profit
  - Pass-through Costs

- Expectations for Construction Pricing Proposal(s) and Negotiations
  - Require initial proposal to be “open book” and cost based
  - Allowance for early works packages and multiple, priced packages
  - Expectations on timing for LS or GMP proposals (“no earlier than / no later than”)
  - Expectations on payment for negotiations
  - Off-ramp provisions if negotiations are unsuccessful
- Invoicing and Payment Provisions
  - LS vs hours / billing rates NTE
- Change Orders
- Termination Provisions

Preconstruction Scope of Work

Including a detailed preconstruction scope allows proposers to price preconstruction services.

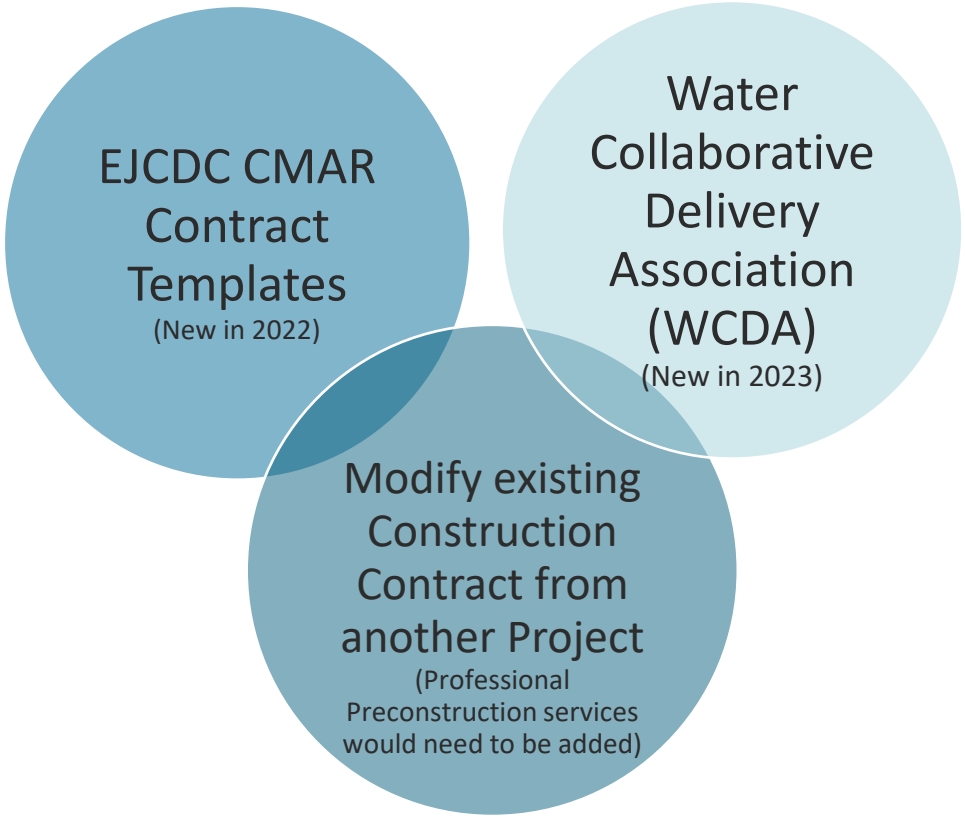
May be modified based on project-specific needs, but generally includes the following:	Project management, Attendance at meetings, Coordination with Engineer
	Cost model development, Cost estimating and reconciliations with Engineer's estimates
	Constructability reviews
	Construction schedule development
	Project sequencing / phasing plan
	Project subcontracting / self-performance plan
	Construction Price Proposal Development

Key Contract Terms – Phase 2 Construction

- Duty to Cooperate with Owner and Engineer
- Duty to Provide a Complete Project and Progress the Work
- Contract Security – Bonds and Insurance
- Pricing and Payment Provisions
  - Lump Sum: Typically based on percent complete and agreed upon schedule of values (may want to negotiate schedule of values as part of Phase 2 negotiations)
  - GMP: Typically based on documented cost of work
    - Self-perform: hours * agreed to labor rates; rates for equipment; materials cost invoices
    - Subcontracted: subcontractor and supplier invoices (note that these may be lump sum)
    - Overhead and profit added to cost of work
    - Bonds and insurance may be cost of work, pass throughs, or included in overhead and profit markups
    - Pricing of general conditions
    - Unallowable costs

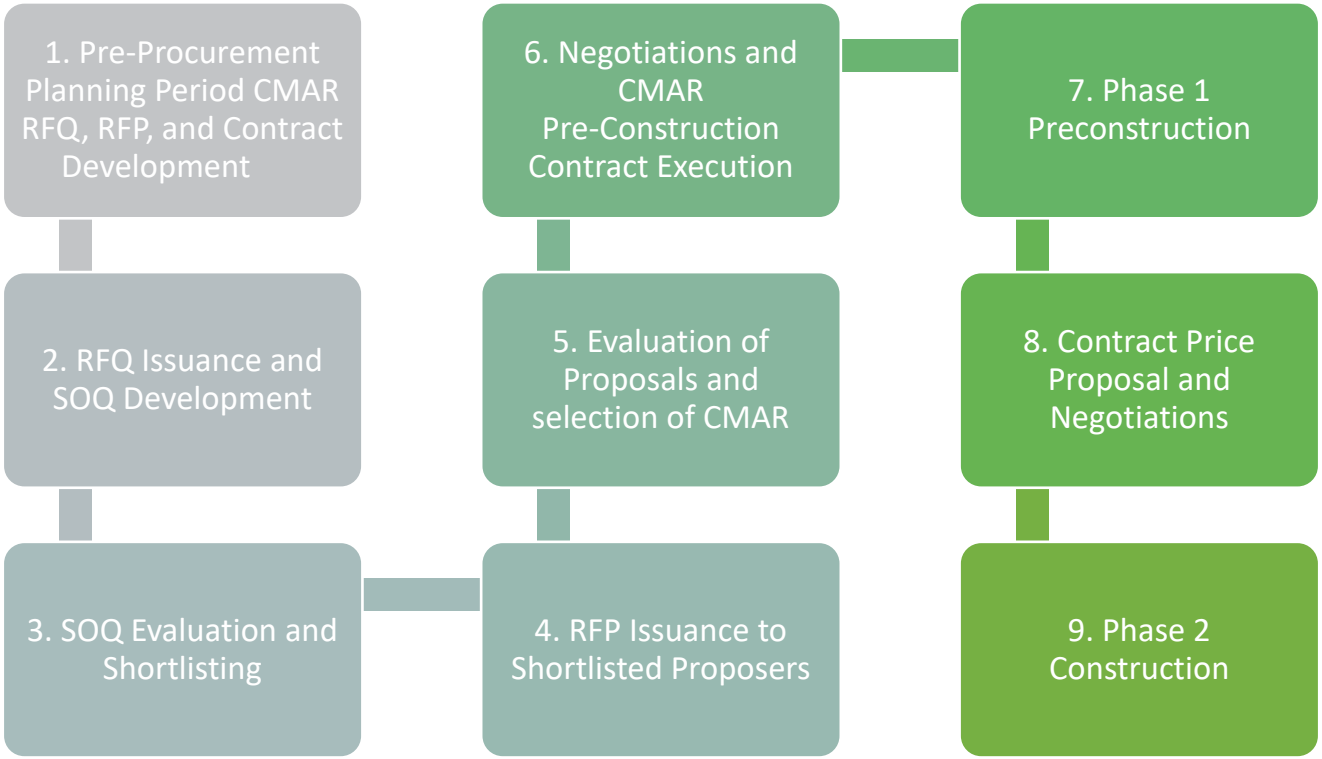
- Scheduling Standards, Obligations and Required Submittals
- Invoicing
- Change Orders
- Termination Provisions
- Incentives and LDs
  - Shared savings provisions (GMP only)
  - Other incentives
  - LDs for delay
- Use of contingencies

Options Available for CMAR Contract Templates



- EJCDC and WCDA templates are a single contract with an amendment for construction services.
- Some owners have two separate contracts: one for preconstruction, and one for construction.

Two Step CMAR Procurement and Project Delivery Timeline



Construction Cost Estimating and Expectations for Open Book Pricing

Pricing Approach during Procurement

As part of the CMAR proposal:

- Request for Phase 1 Preconstruction Services price.
- Request Phase 2 Construction phase fees (inclusive of OH and Profit) to be applied to construction ‘cost’.
- The benefit to this approach is fees are provided under competitive tension.

Pricing Approach – During Preconstruction
Cost Model Development and Validation

Cost Estimate Template Development

- The cost model provides a format (or template) for the cost estimate,
- Establishes the expectation for open book transparency, and defines the following:
  - Assumptions
  - Work breakdown structure
  - Line-item details (and how the estimate rolls up to subtotals)
  - Fee % (inclusive of overhead and profit)
- The cost model documents 'how the math works'
  - How unit costs and production rates interrelate
  - When and how fee is applied (are there 'pass through' costs?)
  - Where contingency and allowances are defined

Cost Estimate Validation

- Validating the cost estimate should include a line-by-line review of the following:
  - Subcontracts and equipment purchase costs
  - Pre-negotiated cost items (indirect costs, equipment rates, etc.)
  - Materials
  - Production rates
  - Early Works Packages (if applicable)
- Gap Analysis
  - Scope
  - Any deviations from the agreed-upon basis of cost
  - Unexpected/mismatched quantities
- Any hidden or arguable assumptions

Pricing Approach - For Construction
What's the difference between Lump Sum vs. GMP?

Lump Sum

- A lump sum is the total price that will be paid to the CMAR (e.g., all reimbursable costs, plus a fee) paid regardless of actual costs incurred.
- Desirable when contingency is low (cost certainty) or if tracking actual cost is a large burden.
- The ***books are closed,*** and invoice backup is generally not required to validate and support costs.
- Costs above the lump sum are the responsibility of the CMAR (unless resulting from an owner-directed change in scope).
- Any underruns accrue to the CMAR.

Guaranteed Maximum Price (GMP)

- A guaranteed maximum price is a cap placed on the sum of all reimbursable costs plus a fee, paid on demonstration of actual costs incurred.
- Desirable when contingency is high (cost uncertainty); there's high likelihood of leftover funds; and tracking actual costs is manageable
- ***Open-book invoicing*** requires the CMAR to provide backup documentation to validate and support the stated costs incurred.
- Costs incurred above the GMP are the responsibility of the CMAR (unless resulting from an owner-directed change in scope)
- Cost underruns at the end of the project can be shared between the CMAR and owner.

Note: Both lump sum and GMP pricing **is developed in an open-book format**, (and later memorialized into the contract). The CMAR must show backup to support its cost estimates, using actual quotes, estimated quantities, labor costs, etc.