

Appendix G
Air Quality Control Equipment
Arrangement Drawings

E.W. Brown

E.W. Brown Units 1 & 2
Constructability Challenges

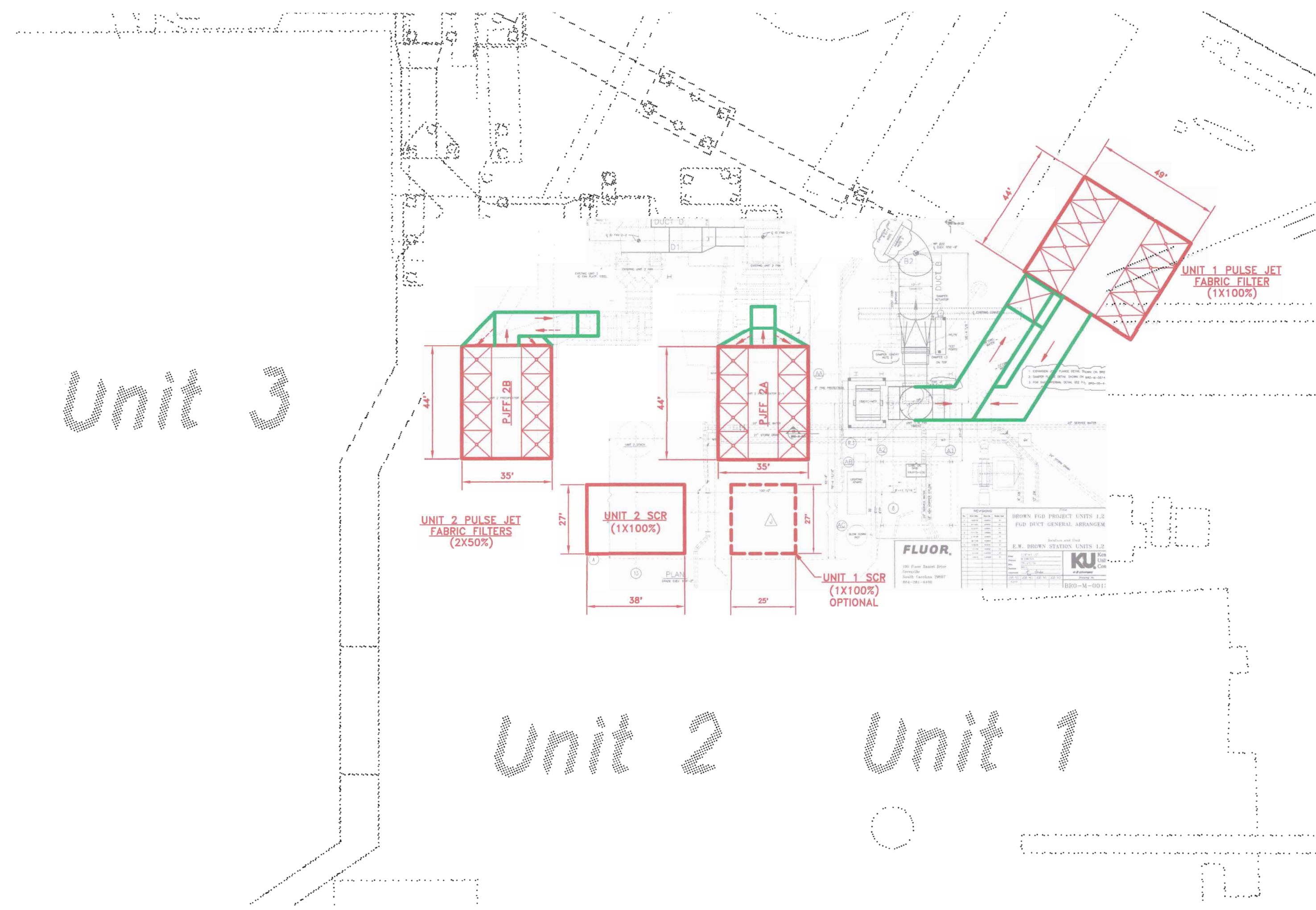
SCR Constructability Challenges

- Real estate constraints for Unit 1 & Unit 2 SCR
- The new SCR duct tie-ins to the existing Unit 1 Air Heater inlet duct will require extensive relocation of existing plant components:
 - Rotate Secondary Air Heater Duct
 - Modify boiler building structural steel bracing and girts to accommodate ductwork
 - Relocate 440V Switchgear 1A and 1B
- The new SCR duct tie-ins to the existing Unit 2 Air Heater inlet duct will require boiler building structural steel bracing and girts to be modified to accommodate ductwork
- The new Unit 2 SCR support structure and reactor box will require extensive relocation/demolition of existing plant components:
 - Relocate or protect field fabricated tank located in base of abandoned Unit 2 chimney shell
 - Demolish Unit 2 chimney
 - Demolish the dust collection ductwork located along the northeast exterior wall of Unit 2 boiler building
 - Relocate Unit 2 Auxiliary Transformer located outside of the northeast exterior wall of Unit 2 boiler building
- The existing coal conveyor and ductwork block crane access to the northeast side of Unit 2 boiler house. This will require Unit 2 SCR structure to be constructed using a large tonnage crane with extended reach capabilities, or by extending the structural support frame system to the east and using a pick and slide execution method to erect the SCR and fabric filter modules

PJFF Constructability Challenges

- Real estate constraints for Unit 2 PJFF
- Elevated PJFF for Unit 2
- Extensive underground investigation will be required to identify operating utilities prior to installing new foundations for Unit 2 fabric filter structural steel support frame.
- The existing coal conveyor and ductwork block crane access to the northeast side of Unit 2 boiler house. This will require Unit Fabric Filter structure to be constructed using a large tonnage crane with extended reach capabilities, or by extending the structural support frame system to the east and using a pick and slide execution method to erect the SCR and fabric filter modules
- Heavy foundations required on the outer ends of Unit 2 ESP's for construction of Unit 2 PJFF.
- Difficult to stage construction equipment for ductwork support frame & associated foundations near ID fans of Unit 1 & Unit 2

LEGEND:
NEW EQUIPMENT - [Red Line]
NEW DUCTWORK - [Green Line]



FLUOR
E.W. BROWN STATION UNITS 1, 2
FUG DUCT GENERAL ARRANGEMENT
BRD-M-0011

Unit 3

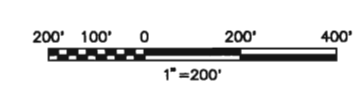
Unit 2

Unit 1

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FOR CONSTRUCTION

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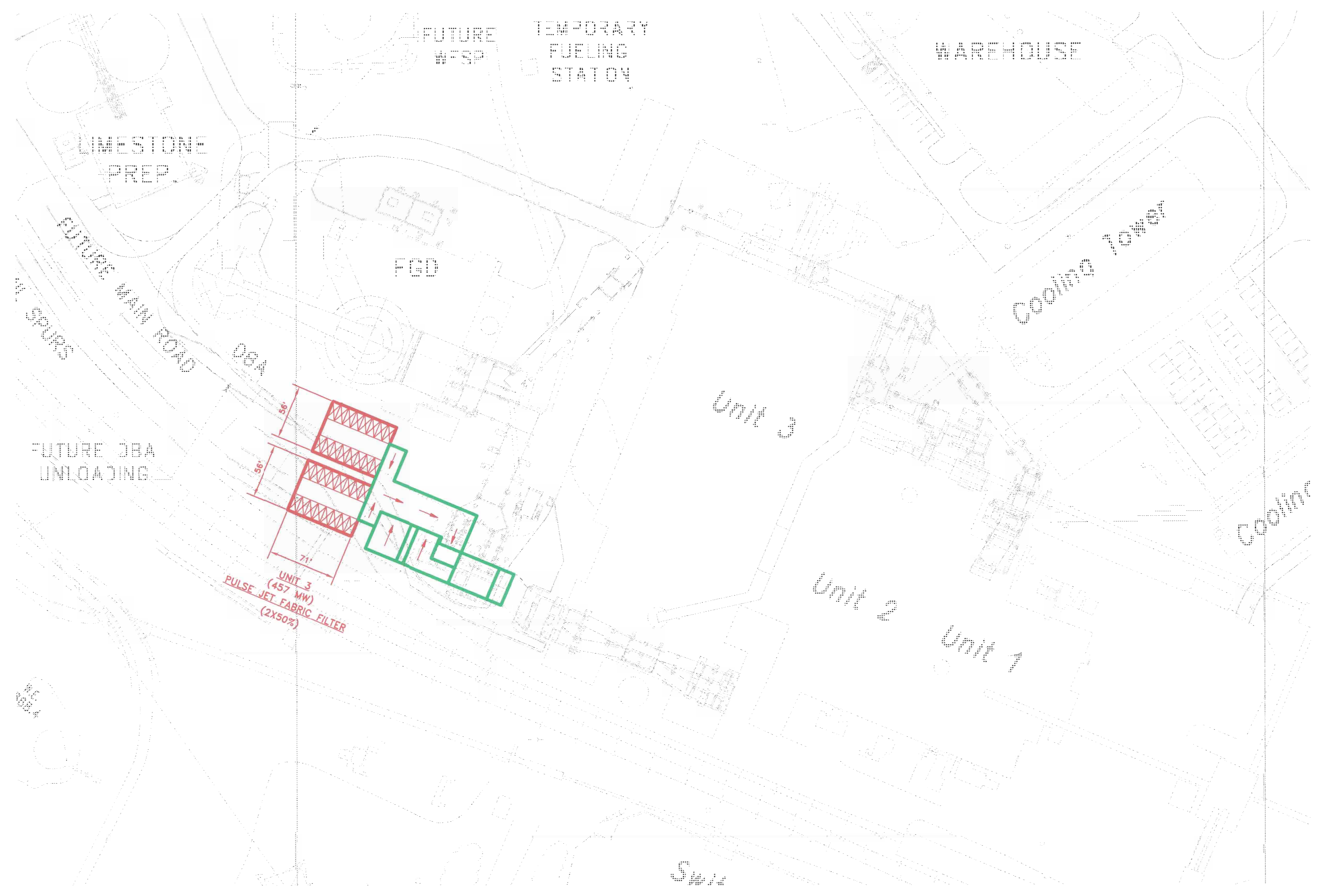


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ENGINEER DRAWN MLW
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E.ON
E W BROWN UNITS 1 & 2 SCR
FUTURE AQC TECHNOLOGY
CONCEPTUAL PLOT PLAN

PROJECT	167987-CAQC-M1006	DRAWING NUMBER	0
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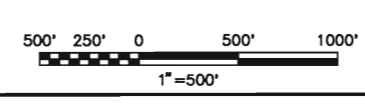
- E.W. Brown Unit 3**
Constructability Challenges
- Relocate ductwork and associated support steel for tie-in.
 - Relocate underground utilities
- AQC Technology and Equipment**
- Pulse Jet Fabric Filter



UNIT 3
 (457 MW)
 PULSE JET FABRIC FILTER
 (2X50%)

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E.ON
 E W BROWN UNITS 1, 2 & 3

FUTURE AQC TECHNOLOGY
 CONCEPTUAL PLOT PLAN

PROJECT: 167987-CAQC-M1005
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 CODE: []
 AREA: []

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E.W. Brown
AQC Technology Options

**E.W. Brown Units 1 & 2
Constructability Challenges**

SCR Constructability Challenges

- Real estate constraints for Unit 1 & Unit 2 SCR
- The new SCR duct tie-ins to the existing Unit 1 Air Heater inlet duct will require extensive relocation of existing plant components:
 1. Rotate Secondary Air Heater Duct
 2. Modify boiler building structural steel bracing and girts to accommodate ductwork
 3. Relocate 440V Switchgear 1A and 1B
- The new SCR duct tie-ins to the existing Unit 2 Air Heater inlet duct will require boiler building structural steel bracing and girts to be modified to accommodate ductwork
- The new Unit 2 SCR support structure and reactor box will require extensive relocation/demolition of existing plant components:
 1. Relocate or protect field fabricated tank located in base of abandoned Unit 2 chimney shell
 2. Demolish Unit 2 chimney
 3. Demolish the dust collection ductwork located along the northeast exterior wall of Unit 2 boiler building
 4. Relocate Unit 2 Auxiliary Transformer located outside of the northeast exterior wall of Unit 2 boiler building
- The existing coal conveyor and ductwork block crane access to the northeast side of Unit 2 boiler house. This will require Unit 2 SCR structure to be constructed using a large tonnage crane with extended reach capabilities, or by extending the structural support frame system to the east and using a pick and slide execution method to erect the SCR and fabric filter modules

PJFF Constructability Challenges

- Real estate constraints for Unit 2 PJFF
- Elevated PJFF for Unit 2
- Extensive underground investigation will be required to identify operating utilities prior to installing new foundations for Unit 2 fabric filter structural steel support frame.
- The existing coal conveyor and ductwork block crane access to the northeast side of Unit 2 boiler house. This will require Unit Fabric Filter structure to be constructed using a large tonnage crane with extended reach capabilities, or by extending the structural support frame system to the east and using a pick and slide execution method to erect the SCR and fabric filter modules
- Heavy foundations required on the outer ends of Unit 2 ESP's for construction of Unit 2 PJFF.
- Difficult to stage construction equipment for ductwork support frame & associated foundations near ID fans of Unit 1 & Unit 2

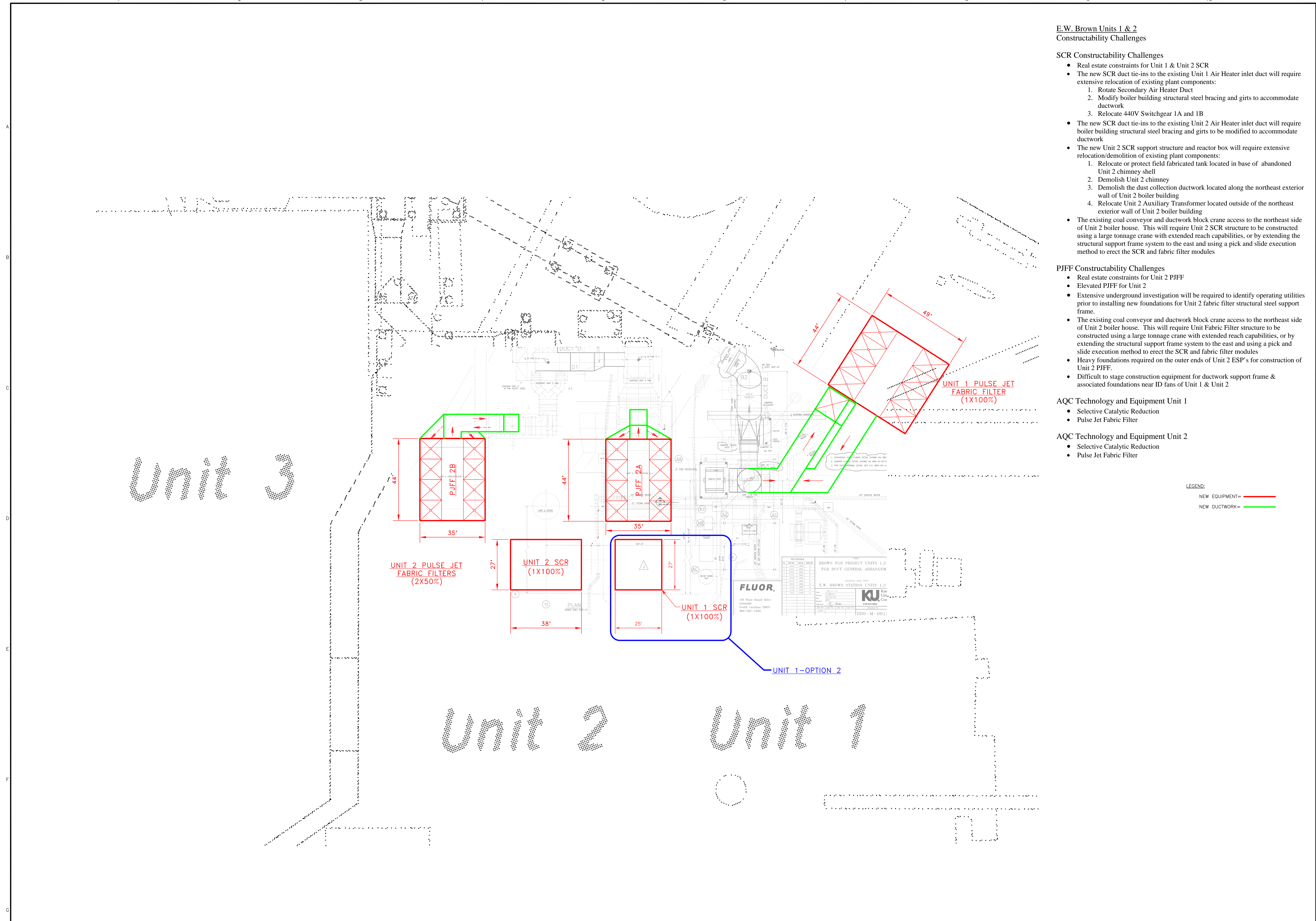
AQC Technology and Equipment Unit 1

- Selective Catalytic Reduction
- Pulse Jet Fabric Filter

AQC Technology and Equipment Unit 2

- Selective Catalytic Reduction
- Pulse Jet Fabric Filter

LEGEND:
NEW EQUIPMENT= —
NEW DUCTWORK= —



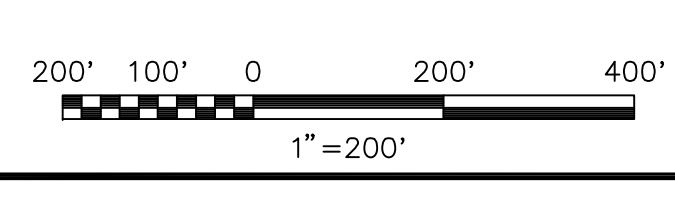
Unit 3

Unit 2

Unit 1

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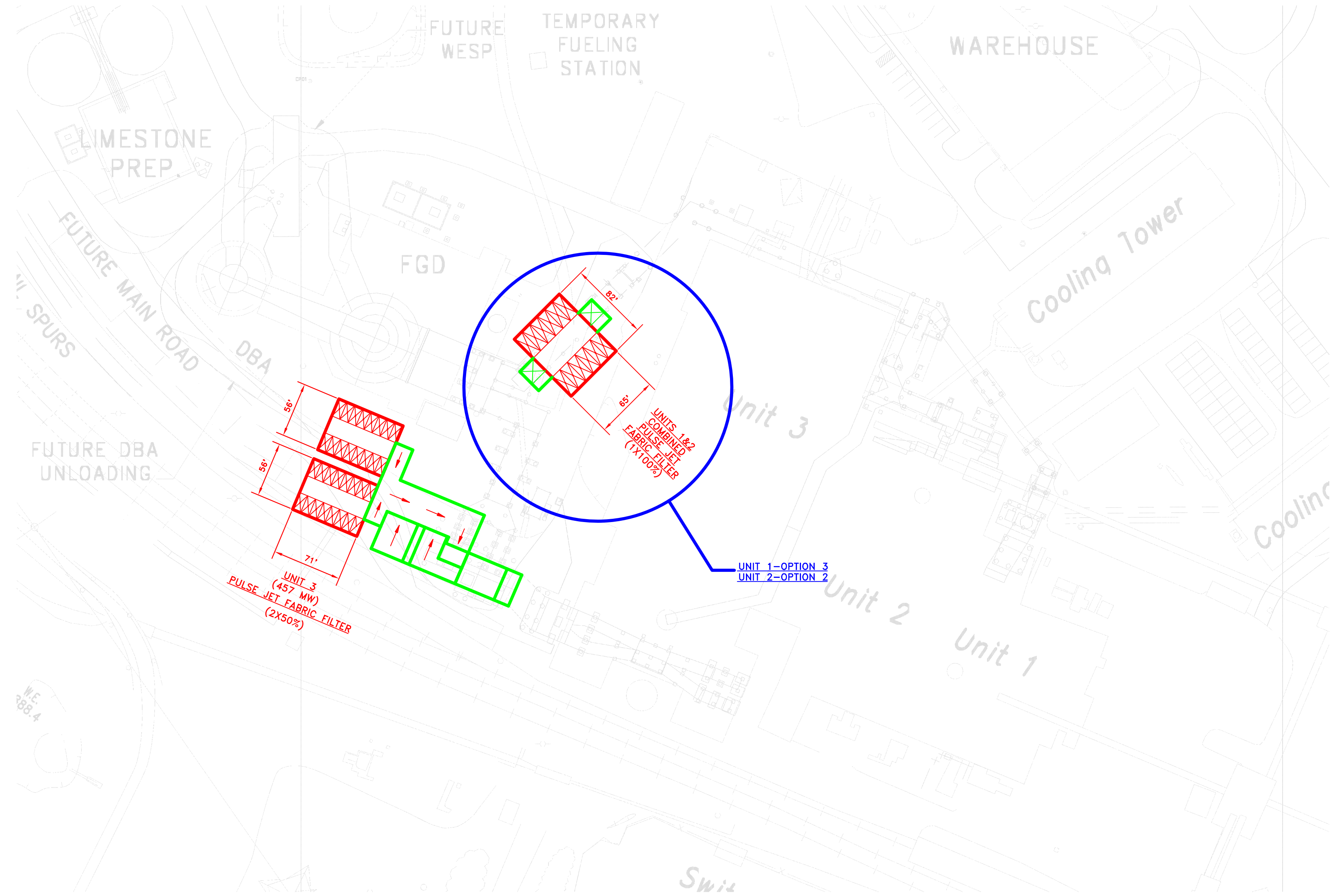
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E W BROWN UNITS 1 & 2 SCR

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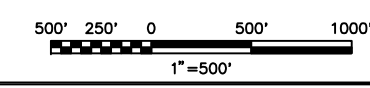
- E.W. Brown Units 1&2**
Constructability Challenges
- Elevated PJFF
 - Relocated Underground Utilities
 - Fabric Filter built on standard frame above existing ductwork
 - Modify structural steel framework
- E.W. Brown Unit 3**
Constructability Challenges
- Relocate ductwork and associated support steel for tie-in.
 - Relocate underground utilities
- AQC Technology and Equipment Units 1&2**
- Common Pulse Jet Fabric Filter
- AQC Technology and Equipment Unit 3**
- Pulse Jet Fabric Filter

LEGEND:
 NEW EQUIPMENT= [Red Line]
 NEW DUCTWORK= [Green Line]



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E.ON
 E W BROWN UNITS 1, 2 & 3
 FUTURE AQC TECHNOLOGY
 CONCEPTUAL PLOT PLAN

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Ghent

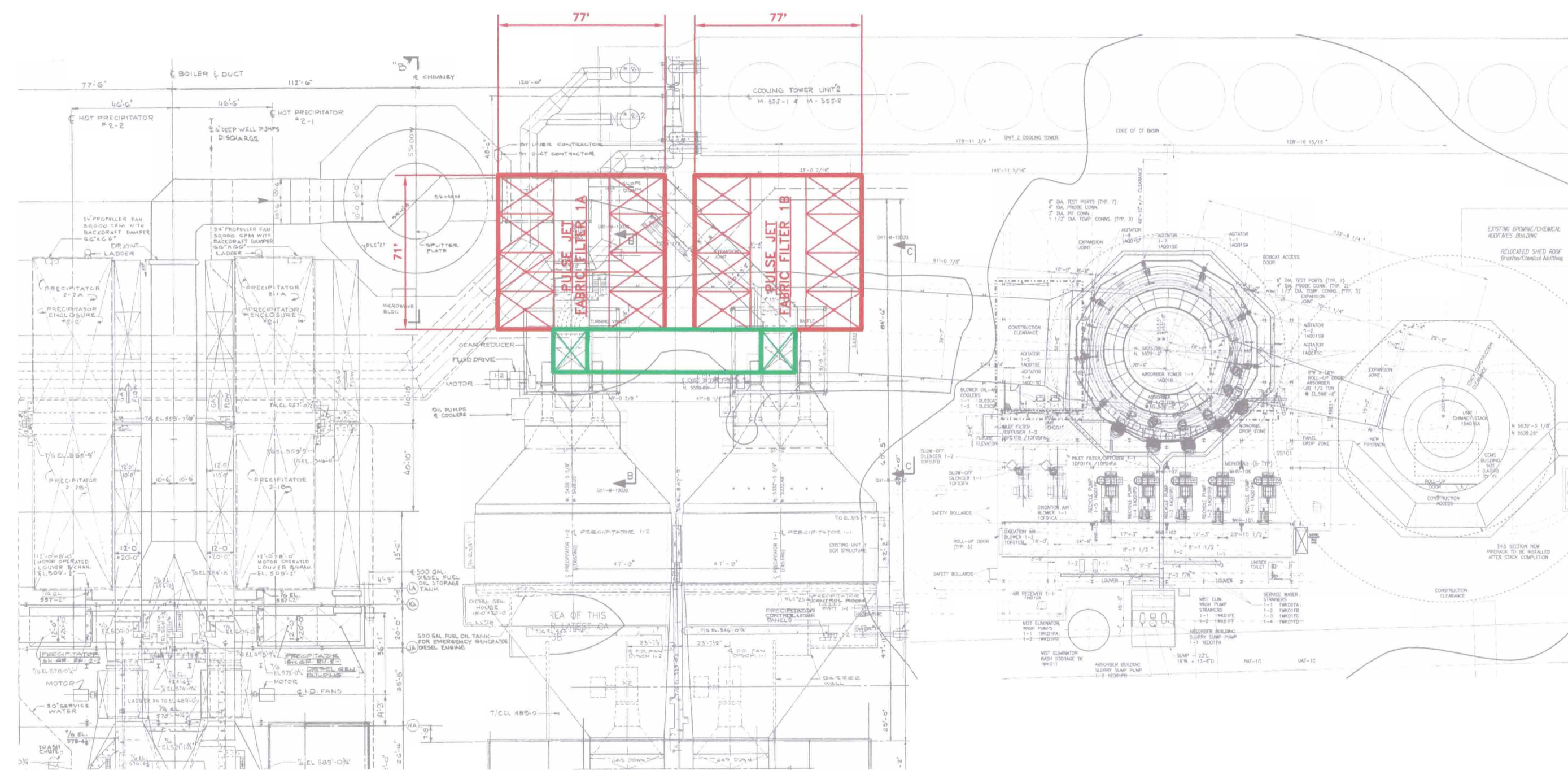
Ghent Unit 1

Constructability Challenges

- Real estate constraints
- Elevated New Pulse Jet Fabric Filter
- Crane access is difficult at Unit 1 due to low overhead pipe rack on the roadways around the cooling towers. Some piping bridges on the northeast side of the cooling tower and access roads to Unit 1 will need to be temporarily taken down or permanently relocated. Lattice boom crawler crane booms will need to be field assembled at the working location.
- Access lanes around Unit 1 are also the maintenance lanes for the cooling towers. Cranes and construction equipment will block access on these roads at various periods during project execution. Careful crane placement will be required in order to provide operations access to the cooling tower area.

AQC Technology and Equipment

- Pulse Jet Fabric Filter



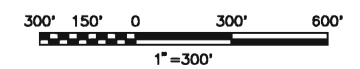
**PULSE JET FABRIC FILTERS
(2X50%)**

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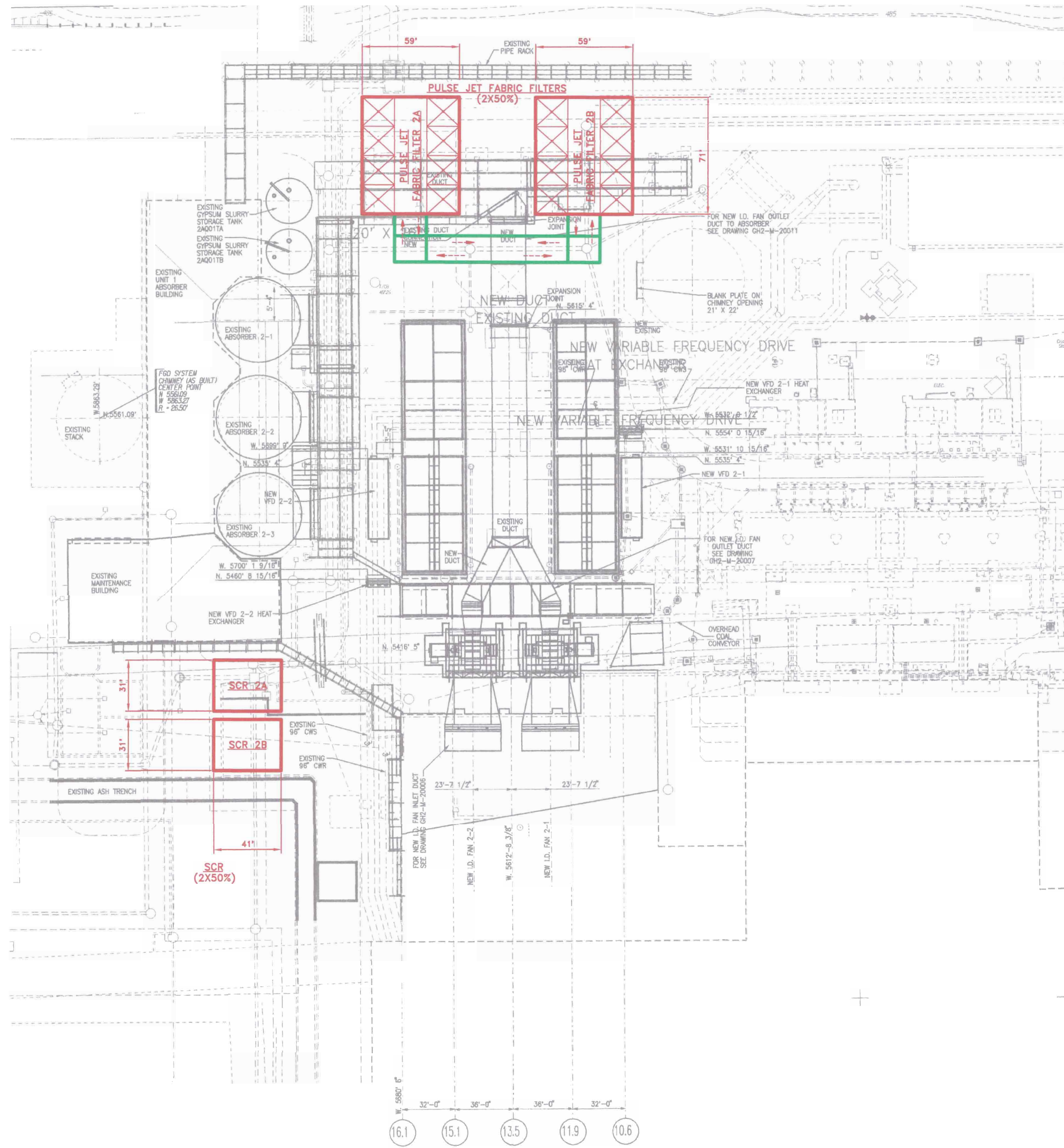
BLACK & VEATCH CORPORATION

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**E.ON
GHENT - UNIT 1**

FUTURE AQC TECHNOLOGY
CONCEPTUAL PLOT PLAN

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PLAN VIEW
EL. 480'-0" THRU 550'-0"

Ghent Unit 2 Pulse Jet Fabric Filter
Constructability Challenges

- Real estate constraints
- Elevated Pulse Jet Fabric Filter
- Crane access is difficult at Unit 2 due to low overhead pipe rack on the roadways around the cooling towers. Some piping bridges on the northeast side of the cooling tower and access roads to Unit 1 will need to be temporarily taken down or relocated. Lattice boom crawler crane booms will need to be final assembled at the working location.
- Access lanes around Unit 2 are also the maintenance lanes for the cooling towers. Cranes and construction equipment will block access on these roads at various periods during project execution. Careful crane placement will be required in order to provide operations access to the cooling tower area.
- Current arrangement for Unit 2 fabric filters require a section of by-pass ductwork to be installed in order to isolate/demolish existing ductwork/duct supports and provide the required footprint for the new equipment. Tie in portions of this work scope must be accomplished during early plant outages.

Ghent Unit 2 SCR
Constructability Challenges

- Erection of Unit 2 SCR will require construction material and equipment to be lifted over areas of high personnel traffic.
- Demolition of overhead walkway.
- Possible use of tower crane for final assembly of SCR
- Demolition & Relocation of pipe rack.

AQC Technology and Equipment

- Selective Catalyst Reduction
- Pulse Jet Fabric Filter

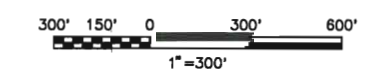


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GHENT - UNIT 2
FUTURE AQC TECHNOLOGY
CONCEPTUAL PLOT PLAN

PROJECT	DRAWING NUMBER	REV
GHENT - UNIT 2	167987-CAQC-M1002	0
CODE	AREA	

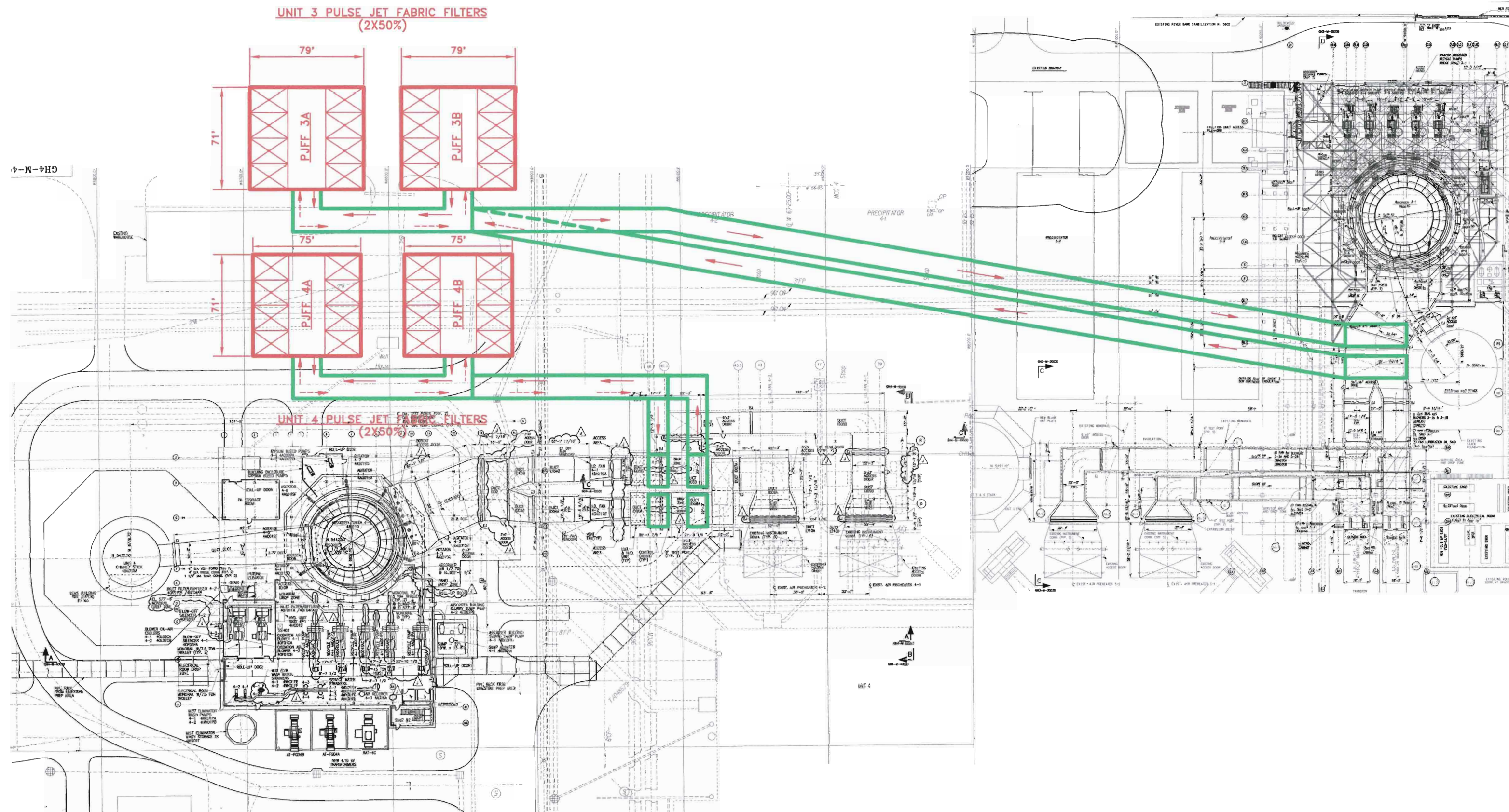
Ghent Units 3&4
Constructability Challenges

- Current arrangement for Unit 3 fabric filters requires an extensive length of inlet/outlet ductwork to be routed above and across the existing Unit 3 & 4 ESP's. Access around the footprint of the ESP's is restricted, and it will be difficult to stage the construction equipment necessary to erect the ductwork support frame and associated foundations.
- Crane access will be restricted around the tie in for Unit 3 fabric filter inlet/outlet ductwork.
- Existing underground electrical manholes, water wells, storm sewer boxes and piping, and circulating cooling water piping all run in the proposed footprint for Unit 4 fabric filter. The electrical manholes, water wells, and storm sewer piping will need to be relocated in order to install the foundations for the Unit 4 fabric filter structural frame.

AQC Technology and Equipment

- Pulse Jet Fabric Filter

LEGEND:
 NEW EQUIPMENT—
 NEW DUCTWORK—

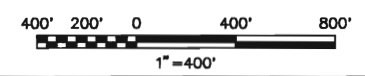


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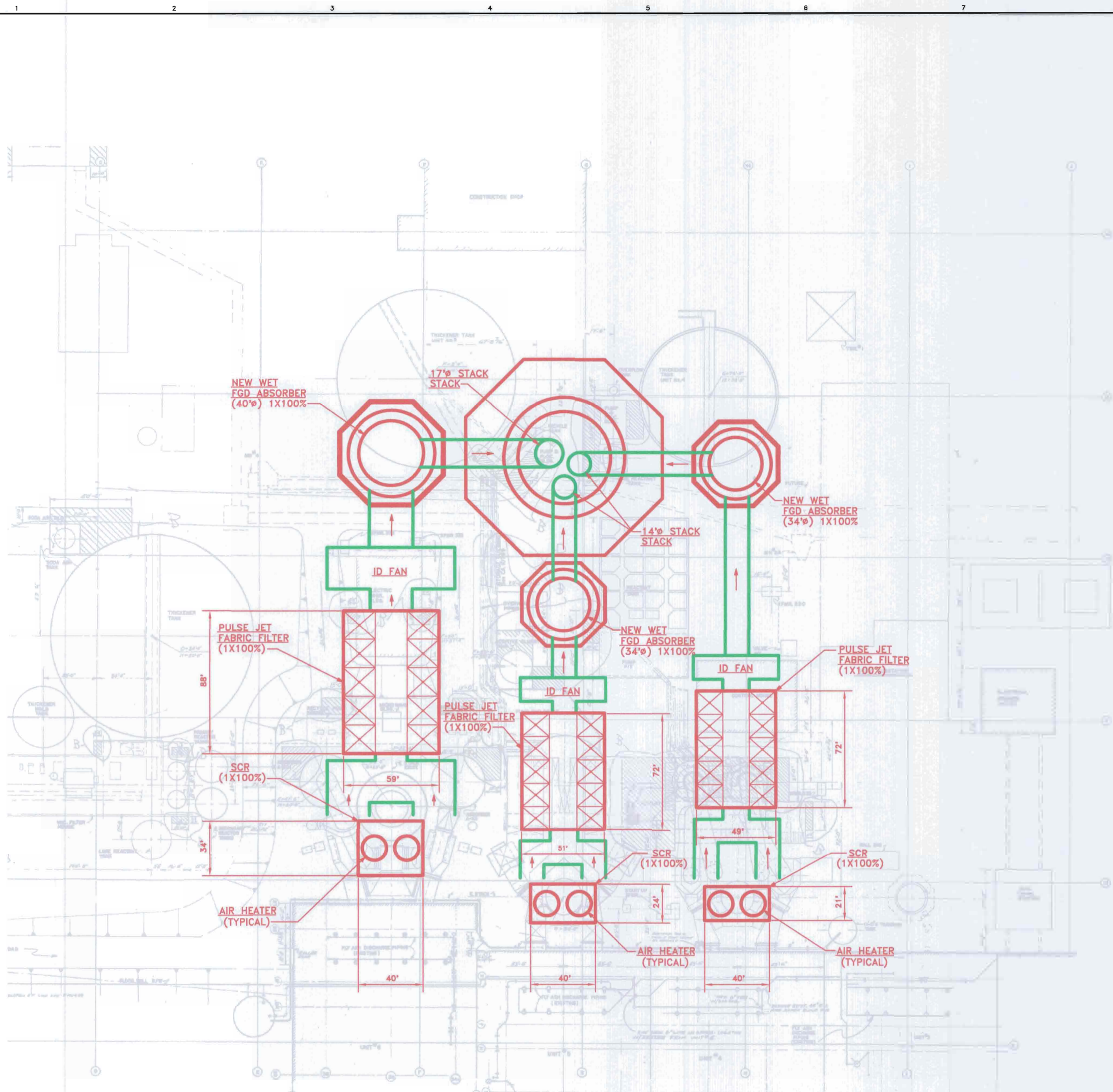


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 GHENT - UNITS 3 & 4
 FUTURE AQC TECHNOLOGY
 CONCEPTUAL PLOT PLAN

PROJECT: 167987-CAQC-M1003
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Cane Run



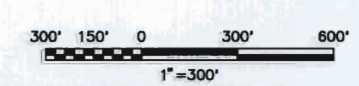
- Cane Run Units 4, 5 & 6**
Constructability Challenges
- Ingress from highways - Multiple power lines need to be raised to accommodate high loads.
 - Barge unloading is not economically feasible.
 - Existing overhead power lines are routed over each unit and must be relocated for crane access.
 - 4kv building and CT switchyard needs to be relocated.
 - Entire unit #5 "back-end" must be dismantled prior to starting any work on unit #4.
 - There is a need for multiple mob/demob/outages for tie-ins and access to build new AQCS equipment.
 - Underground utility interferences/relocations.
 - Above ground utility interferences/relocations.
 - Need for areas to build ammonia storage, ASH handling systems, limestone handling, Reagent Prep, Dewatering (Ancillary Systems)
 - Extended outages (entire plant) needed to accommodate construction of new AQCS Systems.
 - Demolition must be performed in multiple phases followed by extensive earthwork activities to bring existing site up to proper elevation.
 - Soils must be tested and stabilized for heavy lift crane operations.
 - Space is very limited around units; the most efficient use of modularization will be compromised.

- AQC Technology and Equipment**
- Selective Catalytic Reduction
 - Pulse Jet Fabric Filter
 - Wet Flue Gas Desulfurization
 - Stack
 - Air heater

LEGEND:
 NEW EQUIPMENT= [Red Line]
 NEW DUCTWORK= [Green Line]

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E.ON
 CANE RUN UNITS 4, 5 & 6
 PROJECT DRAWING NUMBER
 167987-CAQC-M1004
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 FUTURE AQCS TECHNOLOGY
 CONCEPTUAL PLOT PLAN

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Mill Creek

Mill Creek Units 1, 2, 3 & 4
Constructability Challenges

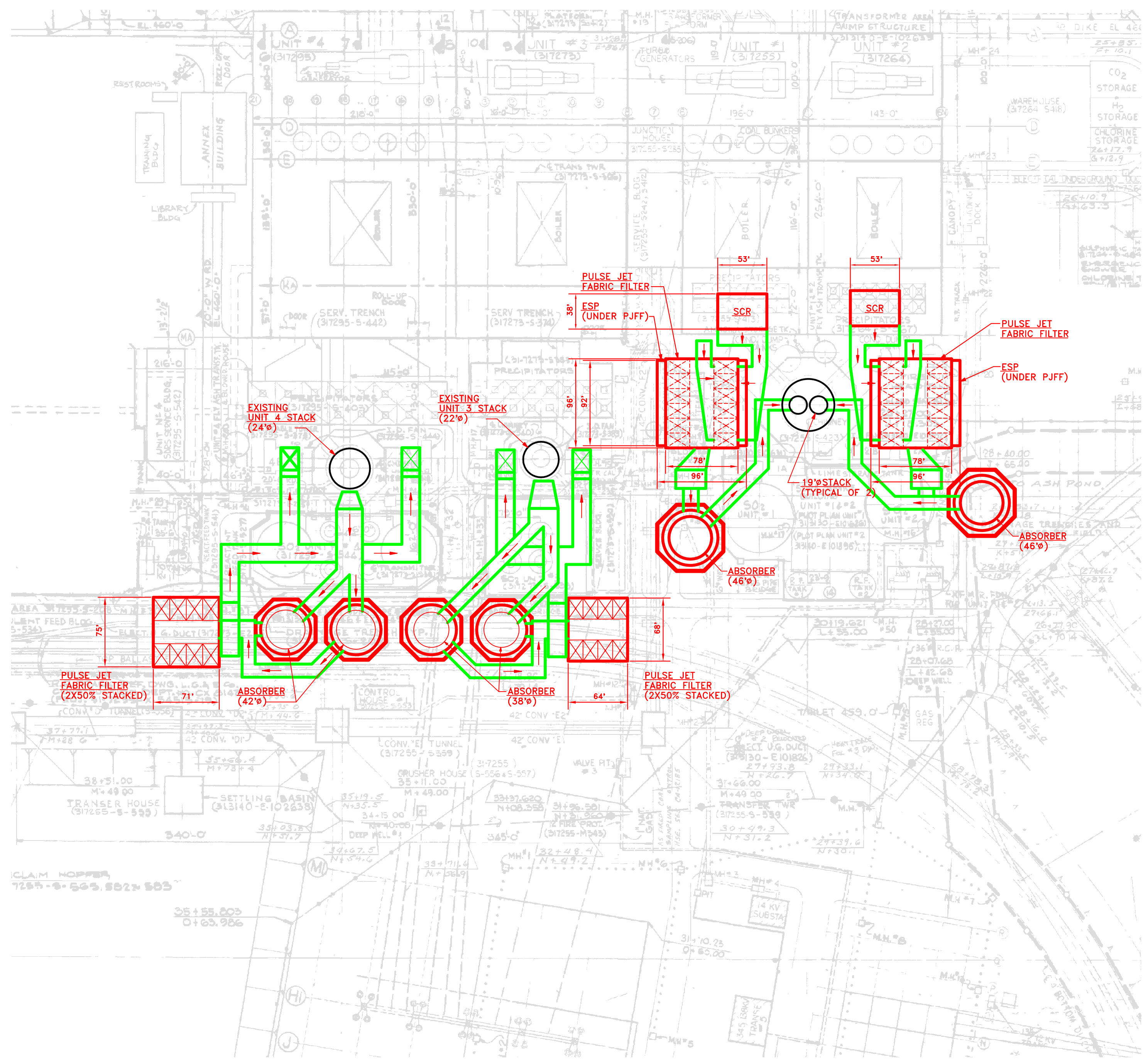
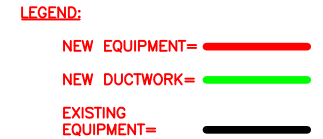
- Real estate constraints for all the units.
- Unit 1 & Unit 2 ESP elevated.
- Unit 3 & Unit 4 PJFF (2x50%) stacked one above another.
- Barge unloading is not economically feasible.
- Overhead power lines and @ least 2 transmission towers must be moved.
- Numerous underground utility interferences/relocations
- Numerous above ground utility interferences/relocations
- Very limited access around units due to existing AQCS Systems.
- Multiple mob/demob (very selective) dismantling operations are needed to insure tie-in work is accomplished efficiently.
- Building between units 1 & 3 from unit #1 work will present logistical problems for both plant work and construction. Access/height restrictions will dictate the magnitude of modularization that can be utilized.
- Warehouse and loading dock on unit #2 side must be relocated.
- High complexity of ancillary systems routing to avoid interference with existing AQCS systems.
- Ground stability will need to be verified, modified to accommodate heavy lift cranes.
- Multiple plant outages will be needed for tie-ins because we are utilizing existing scrubbers, etc...through out project.
- Ductwork routing is more extensive due to the lay out of the existing plant and existing AQCS systems in use. Space will be a premium for excavations/foundations/duct steel erection.
- Large existing concrete foundations will need to be removed to accommodate equipment.
- Outage windows are very short and limited.
- Site constraints due to existing rail road tracks.

AQC Technology and Equipment Units 1 & 2

- Selective Catalyst Reduction.
- Electrostatic Precipitator and Pulse Jet Fabric Filter
- Wet Flue Gas Desulfurization

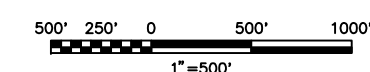
AQC Technology and Equipment Units 3 & 4

- Pulse Jet Fabric Filter
- Wet Flue Gas Desulfurization



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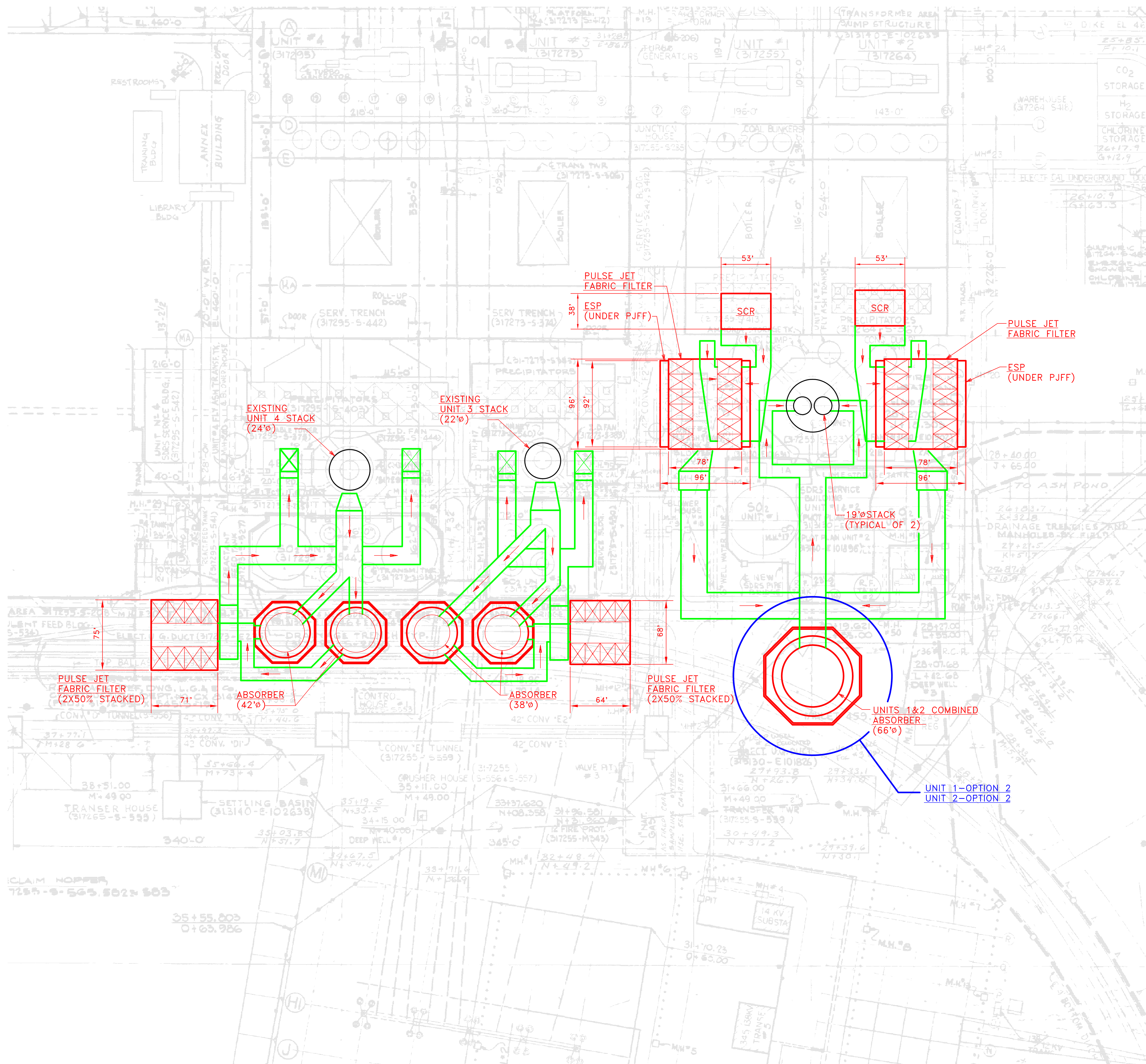
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E.ON
 MILL CREEK UNITS 1, 2, 3 & 4
 FUTURE AQCS TECHNOLOGY
 CONCEPTUAL PLOT PLAN

PROJECT	DRAWING NUMBER	REV
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CODE	AREA	

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**Mill Creek
AQC Technology Options**



Mill Creek Units 1, 2, 3 & 4
Constructability Challenges

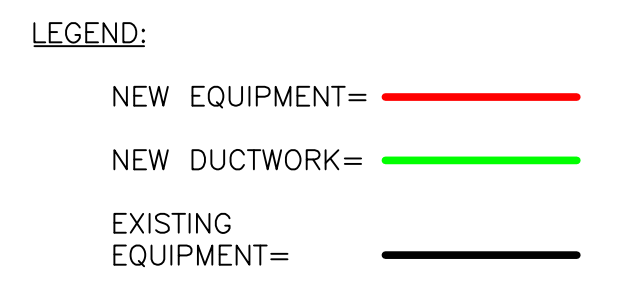
- Real estate constraints for all the units.
- Unit 1 & Unit 2 ESP elevated.
- Unit 3 & Unit 4 PJFF (2x50%) stacked one above another.
- Barge unloading is not economically feasible.
- Overhead power lines and @ least 2 transmission towers must be moved.
- Numerous underground utility interferences/relocations
- Numerous above ground utility interferences/relocations
- Very limited access around units due to existing AQCS Systems.
- Multiple mob/demob (very selective) dismantling operations are needed to insure tie-in work is accomplished efficiently.
- Building between units 1 & 3 from unit #1 work will present logistical problems for both plant work and construction. Access/height restrictions will dictate the magnitude of modularization that can be utilized.
- Warehouse and loading dock on unit #2 side must be relocated.
- High complexity of ancillary systems routing to avoid interference with existing AQCS systems.
- Ground stability will need to be verified, modified to accommodate heavy lift cranes.
- Multiple plant outages will be needed for tie-ins because we are utilizing existing scrubbers, etc...through out project.
- Ductwork routing is more extensive due to the lay out of the existing plant and existing AQCS systems in use. Space will be a premium for excavations/foundations/duct steel erection.
- Large existing concrete foundations will need to be removed to accommodate equipment.
- Outage windows are very short and limited.
- Site constraints due to existing rail road tracks.
- Units 1&2 WFGD will have more ductwork but simple straight forward routing.
- Selective demolition more complex due to ductwork routing.

AQC Technology and Equipment Units 1 & 2

- Selective Catalyst Reduction.
- Electrostatic Precipitator and Pulse Jet Fabric Filter
- Combined Wet Flue Gas Desulfurization

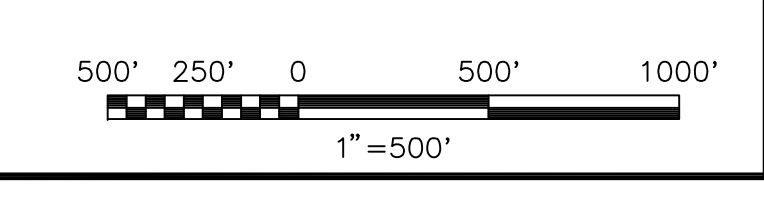
AQC Technology and Equipment Units 3 & 4

- Pulse Jet Fabric Filter
- Wet Flue Gas Desulfurization



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MILL CREEK UNITS 1, 2, 3 & 4		167987-CAQC-M1011	0
FUTURE AQC TECHNOLOGY CONCEPTUAL PLOT PLAN		CODE	
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Mill Creek Units 1, 2, 3 & 4
Constructability Challenges

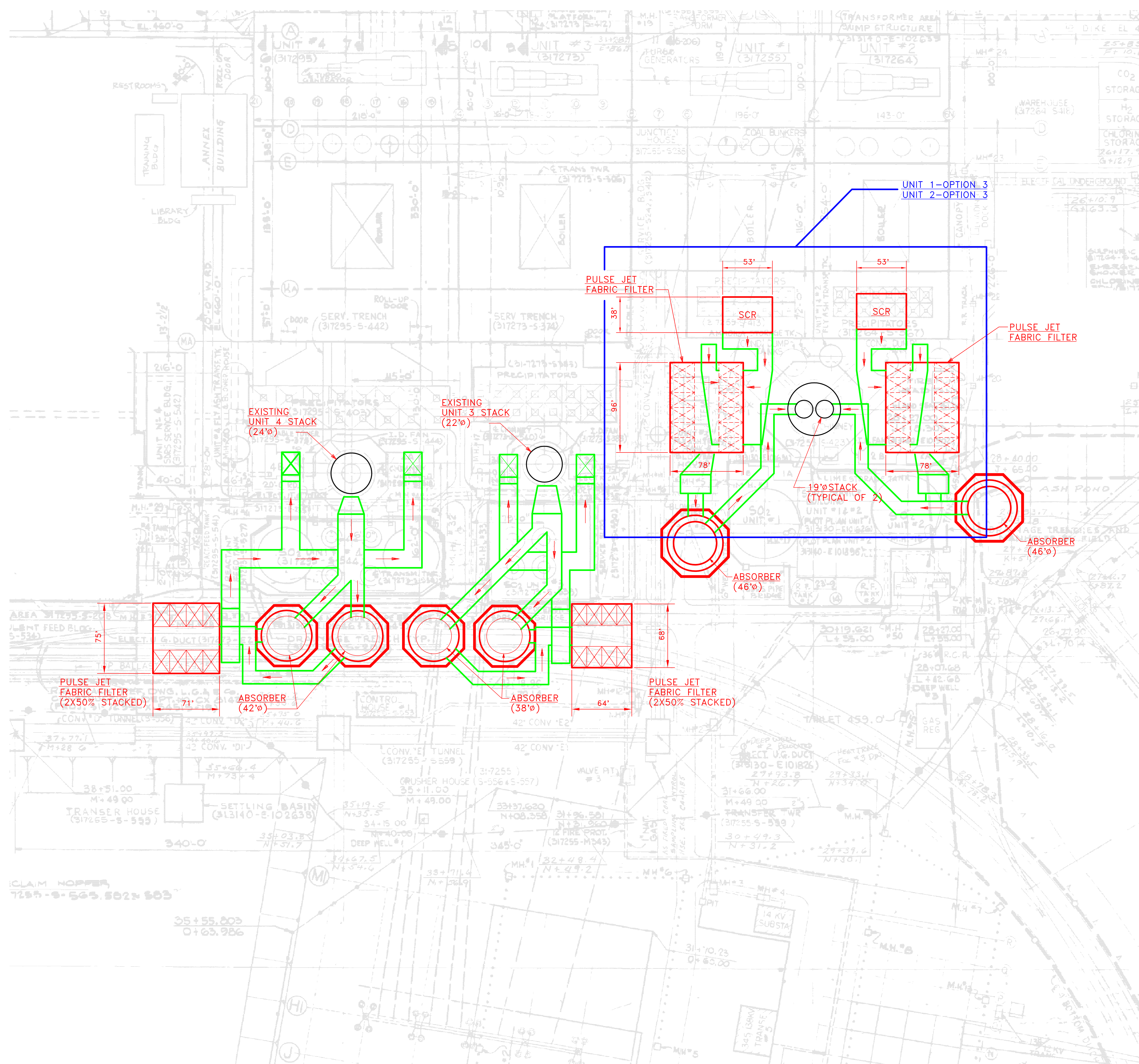
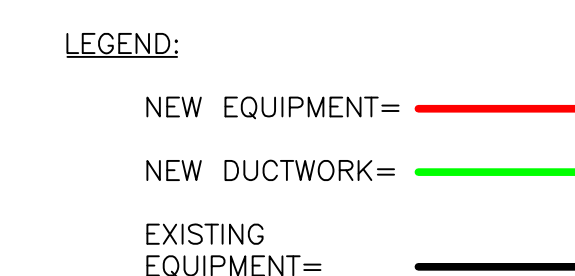
- Real estate constraints for all the units.
- Unit 3 & Unit 4 PJFF (2x50%) stacked one above another.
- Barge unloading is not economically feasible.
- Overhead power lines and @ least 2 transmission towers must be moved.
- Numerous underground utility interferences/relocations
- Numerous above ground utility interferences/relocations
- Very limited access around units due to existing AQCS Systems.
- Multiple mob/demob (very selective) dismantling operations are needed to insure tie-in work is accomplished efficiently.
- Building between units 1 & 3 from unit #1 work will present logistical problems for both plant work and construction. Access/height restrictions will dictate the magnitude of modularization that can be utilized.
- Warehouse and loading dock on unit #2 side must be relocated.
- High complexity of ancillary systems routing to avoid interference with existing AQCS systems.
- Ground stability will need to be verified, modified to accommodate heavy lift cranes.
- Multiple plant outages will be needed for tie-ins because we are utilizing existing scrubbers, etc...through out project.
- Ductwork routing is more extensive due to the lay out of the existing plant and existing AQCS systems in use. Space will be a premium for excavations/foundations/duct steel erection.
- Large existing concrete foundations will need to be removed to accommodate equipment.
- Outage windows are very short and limited.
- Site constraints due to existing rail road tracks.

AQC Technology and Equipment Units 1 & 2

- Selective Catalyst Reduction.
- Pulse Jet Fabric Filter
- Wet Flue Gas Desulphurization

AQC Technology and Equipment Units 3 & 4

- Pulse Jet Fabric Filter
- Wet Flue Gas Desulphurization

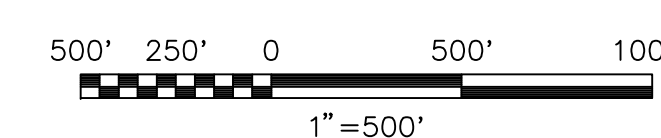


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W104556 ACAD 16.1s (MS Tech) 07/26/10 12:54:14

NO.	DATE	REVISIONS AND RECORD OF ISSUE	MLW
0	06/JUL/10	REMOVED ESP FOR UNITS 1&2	MLW
		REVISIONS AND RECORD OF ISSUE	DRN/DES/CHK/PDE/APP



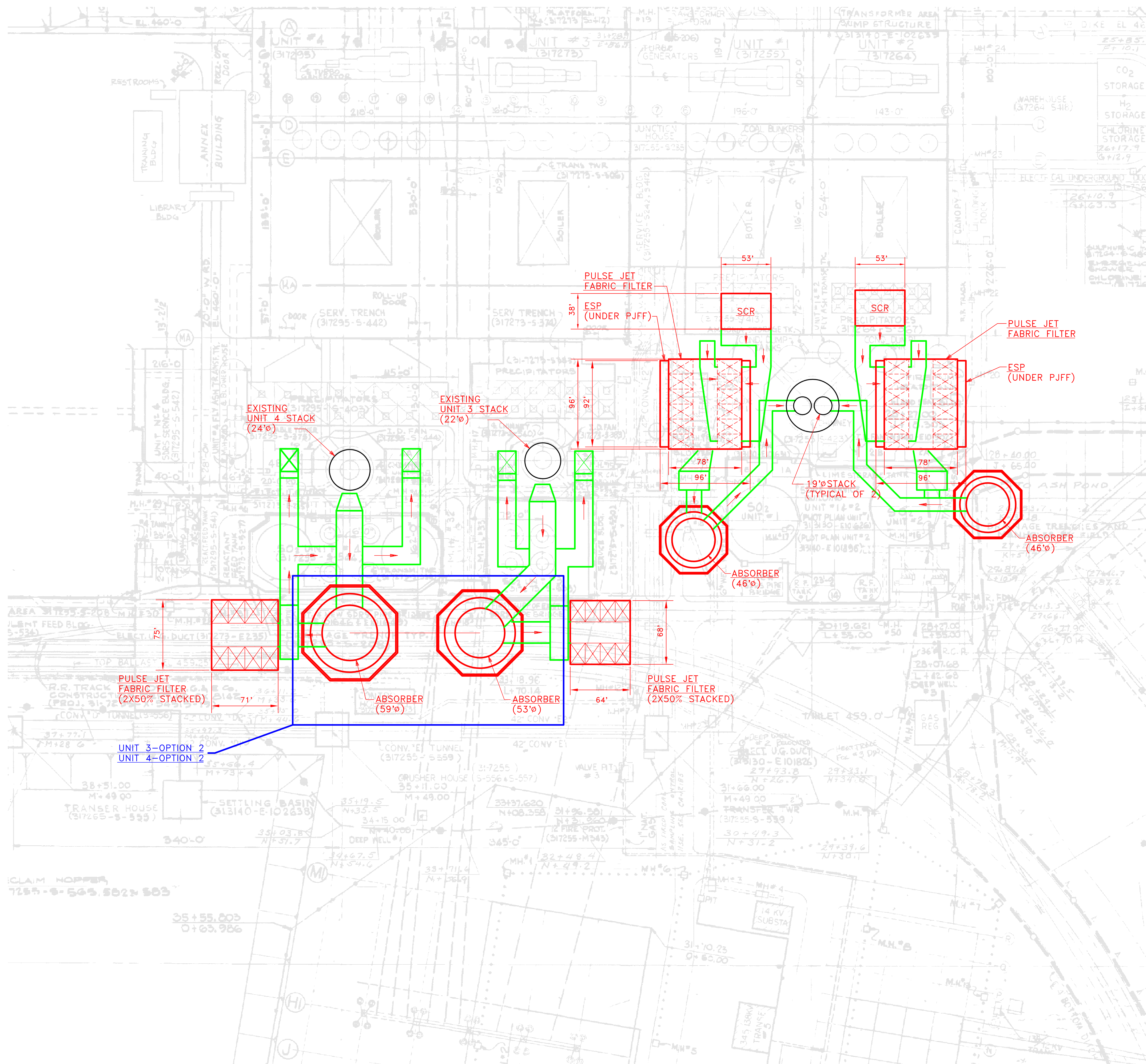
BLACK & VEATCH CORPORATION

ENGINEER: — MLW
 CHECKED: — DATE

E.ON.
 MILL CREEK UNITS 1, 2, 3 & 4

FUTURE AQC TECHNOLOGY
 CONCEPTUAL PLOT PLAN

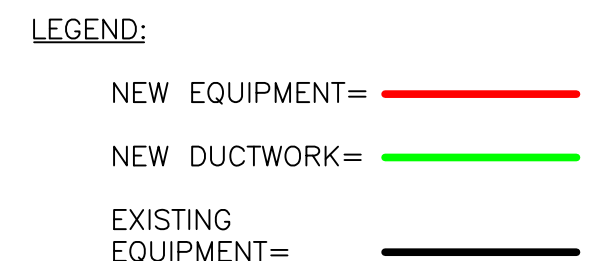
PROJECT	DRAWING NUMBER	REV
MILL CREEK UNITS 1, 2, 3 & 4	167987-CAQC-M1012	0
CODE	AREA	



- Mill Creek Units 1, 2, 3 & 4 Constructability Challenges**
- Real estate constraints for all the units.
 - Unit 1 & Unit 2 ESP elevated.
 - Unit 3 & Unit 4 PJFF (2x50%) stacked one above another.
 - Barge unloading is not economically feasible.
 - Overhead power lines and @ least 2 transmission towers must be moved.
 - Numerous underground utility interferences/relocations
 - Numerous above ground utility interferences/relocations
 - Very limited access around units due to existing AQCS Systems.
 - Multiple mob/demob (very selective) dismantling operations are needed to insure tie-in work is accomplished efficiently.
 - Building between units 1 & 3 from unit #1 work will present logistical problems for both plant work and construction. Access/height restrictions will dictate the magnitude of modularization that can be utilized.
 - Warehouse and loading dock on unit #2 side must be relocated.
 - High complexity of ancillary systems routing to avoid interference with existing AQCS systems.
 - Ground stability will need to be verified, modified to accommodate heavy lift cranes.
 - Multiple plant outages will be needed for tie-ins because we are utilizing existing scrubbers, etc...through out project.
 - Ductwork routing is more extensive due to the lay out of the existing plant and existing AQCS systems in use. Space will be a premium for excavations/foundations/duct steel erection.
 - Large existing concrete foundations will need to be removed to accommodate equipment.
 - Outage windows are very short and limited.
 - Site constraints due to existing rail road tracks.
 - Units 3&4 WFGD will have much simpler, less ductwork and straight forward routing.
 - Selective demolition more complex due to ductwork routing.

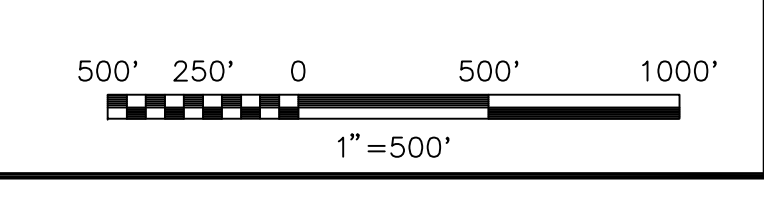
- AQC Technology and Equipment Units 1 & 2**
- Selective Catalyst Reduction.
 - Electrostatic Precipitator and Pulse Jet Fabric Filter
 - Wet Flue Gas Desulphurization modules.

- AQC Technology and Equipment Units 3 & 4**
- Pulse Jet Fabric Filter
 - Larger Wet Flue Gas Desulphurization



W104556 ACAD 16.1s (LMS Tech)
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 07/26/10 12:29:37

NO.	DATE	REVISIONS AND RECORD OF ISSUE	MLW
0	06/JUL/10	LARGER WFGD MODULES FOR UNITS 3&4	MLW
		REVISIONS AND RECORD OF ISSUE	DRN/DES/CHK/PDE/APP



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ENGINEER: [] DRAWN: [] MLW
 CHECKED: [] DATE: []

E.ON. MILL CREEK UNITS 1, 2, 3 & 4		PROJECT DRAWING NUMBER 167987-CAQC-M1013	REV 0
FUTURE AQC TECHNOLOGY CONCEPTUAL PLOT PLAN		CODE AREA	

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Trimble County

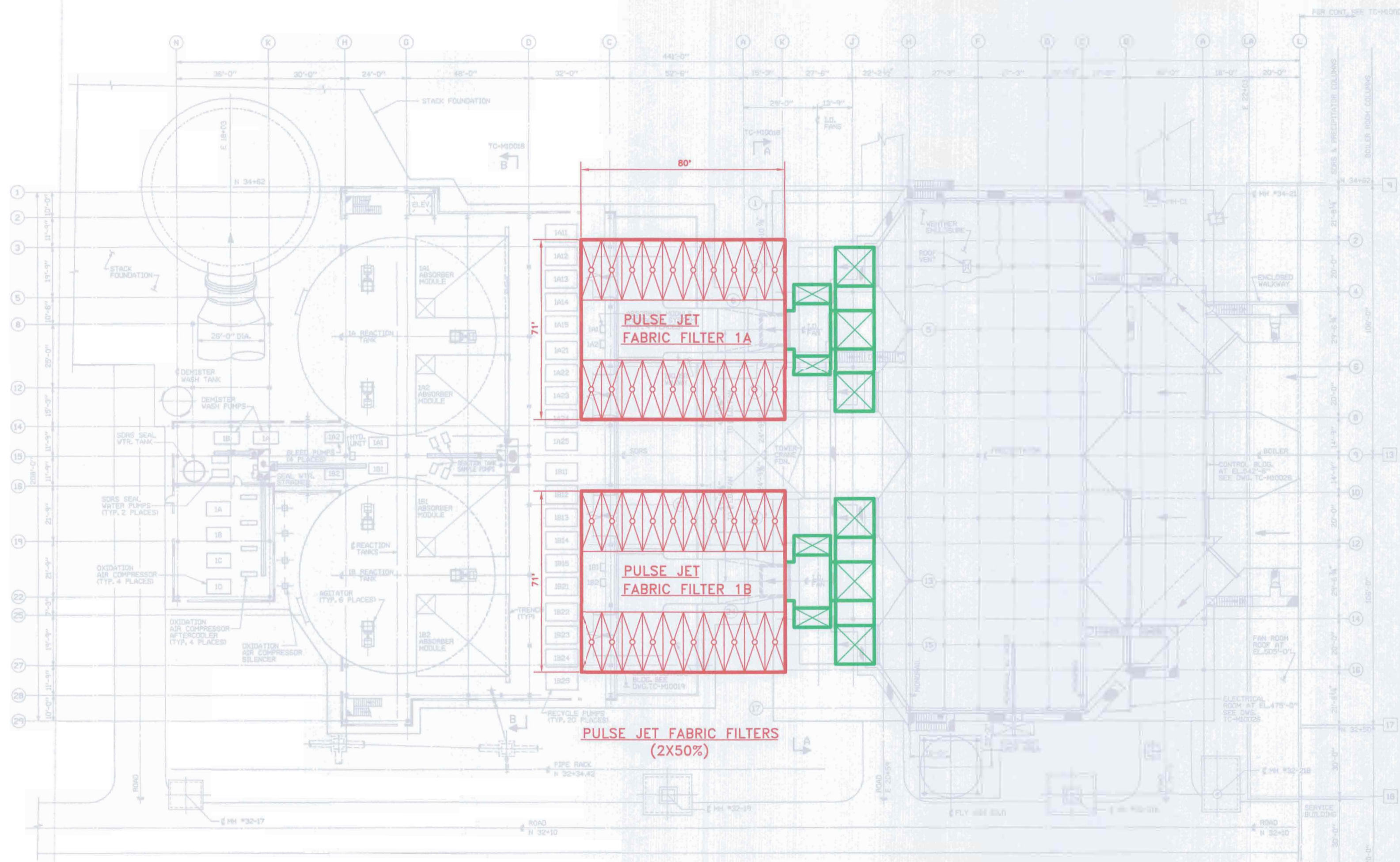
Trimble County Unit 1
Constructability Challenges

- Real estate constraints
- Elevated Pulse Jet Fabric Filter
- Extensive underground investigation will be required to identify operating utilities prior to installing new foundations
- An existing abandoned tower crane foundation and multiple runs of electrical duct bank cover a large percentage of the area within the footprint proposed to install foundations for the Unit 1 fabric filter support frame.

AQC Technology and Equipment

- Pulse Jet Fabric Filter

LEGEND:
NEW EQUIPMENT—
NEW DUCTWORK—



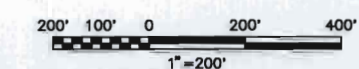
PULSE JET FABRIC FILTERS
(2X50%)

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WLD4556
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16:14 (LMS Tech)
1
167987

NO	DATE	REVISIONS AND RECORD OF ISSUE	MLW
0	16/JUN/10	INITIAL ISSUE	MLW



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ENGINEER
DRAWN
CHECKED

E.ON TRIMBLE COUNTY UNIT 1
FUTURE AQC TECHNOLOGY CONCEPTUAL PLOT PLAN

PROJECT: **167987-CAQC-M1009**
DRAWING NUMBER: **167987-CAQC-M1009**
REV: **0**

Green River

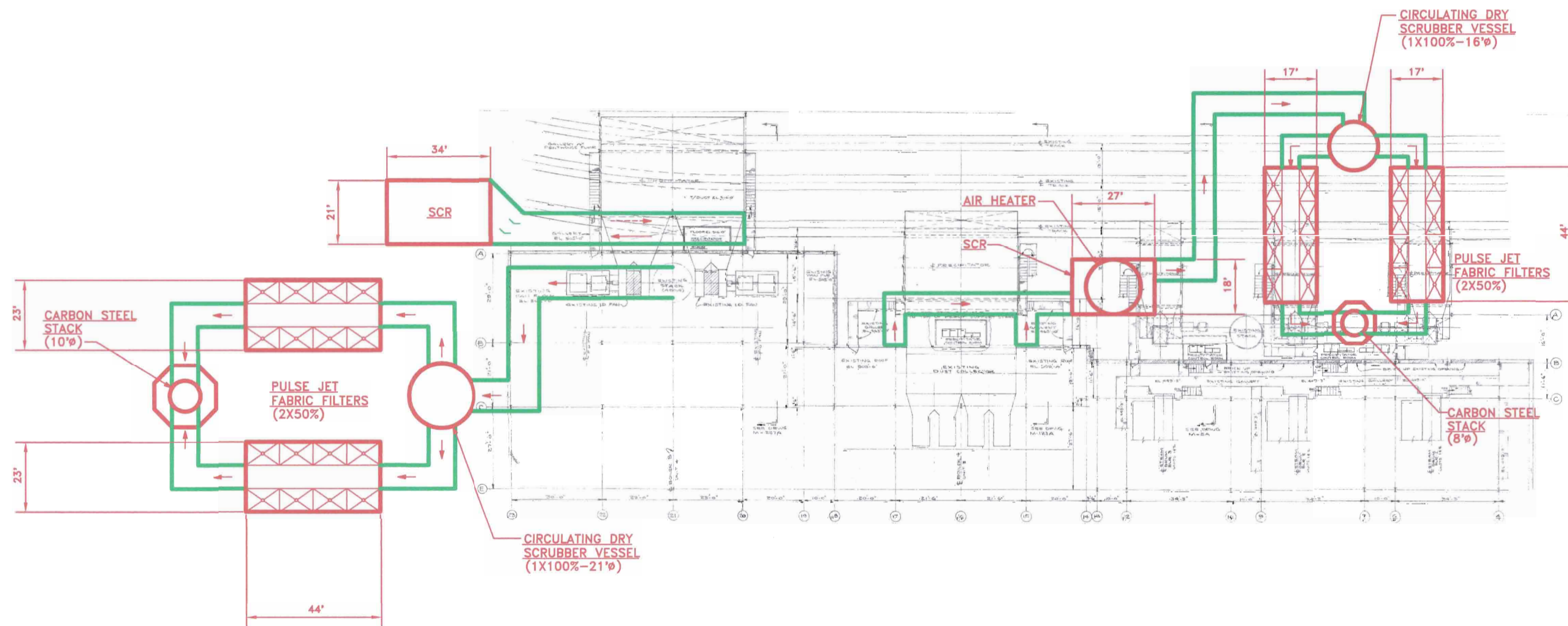
Green River Units 3 & 4
Constructability Challenges

- Overhead power lines and one tower needs to be relocated.
- Underground utility interferences/relocations
- Above ground utility interferences/relocations

AQC Technology and Equipment

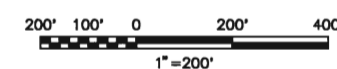
- Selective Catalyst Reduction
- Circulating Dry Scrubber
- Pulse Jet Fabric Filter
- Stack
- Air Heater

LEGEND:
NEW EQUIPMENT= [Red Line]
NEW DUCTWORK= [Green Line]



MUC009 E1
 ACQ 16.1s (US Tech)
 06/16/10 14:19:09

NO	DATE	REVISIONS AND RECORD OF ISSUE	DRN/CHK/PDE/APP
0	16/JUN/10	INITIAL ISSUE	MLW



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ENGINEER: [] DRAWN: MLW
CHECKED: [] DATE: []

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PROJECT	DRAWING NUMBER	REV
E.ON. GREEN RIVER UNITS 3 & 4	167987-CAQC-M1007	0
CODE	AREA	

FUTURE AQC TECHNOLOGY
CONCEPTUAL PLOT PLAN