5360-Narragansett Electric and Gas
Project Revision Detail Report

Fund Project Number:	C047495	**USSC #:**	
Revision:	1	**Budget Version:**	Default
Project Title:	DG SVC OCI Solar RI-233		
Project Description:	Provide distributed generation service to OCI Solar attyhe Forbes Street Landfill, East Providence RI (RI-233)		

Project Status:	open		
Responsible Person:		**Initiator:**	Teixeira, John M
Spending Rationale:	Customer Request/Public Require	**Funding Type:**	P Electric Distribution Line RI
Budget Class:	Distributed Generation		
Capital by Category:			
Program Code:			
Project Risk Score:	49	**Project Complexity Score:**	15

Project Schedule / Expenditures

Revision Status:	Approved		
Est Start Date:	1/16/2013	**Est Complete Date:**	3/1/2014
Est In-Service Date:	3/1/2014		
TTD Actuals:	$254,498	**As Of:**	10/3/2017

Cost Breakdown	**Capital**	**Expense**	**Removal**	**Total**	**Credits**
	$804,600	$135,200	$44,700	$984,500	($1,075,340

Justification / Risk Identification:

OCI Solar has proposed an interconnection of a total of 3000 kW, of 3 Phase of PV based genereration. This system will export power as it is proposed to be an independent power producer. The site is located at the Forbes St Landfill, East Providence, RI.

Project Scope:

On the 2267 circuit: Install one loadbreak at P3 Willet and one Recloser on pole 4 Willet. Extend 2267 5100 Cirt Ft (1/0 AAC) down Willet to Forbes down to pole 28 Forbes St.

At the customer location: Install one loadbreak switch, one recloser and one 23 kV primary metering assembly.

Project Alternatives Considered:

A 15kV class circuit was not available to serve this load.

Additional Notes:

<Enter data here>

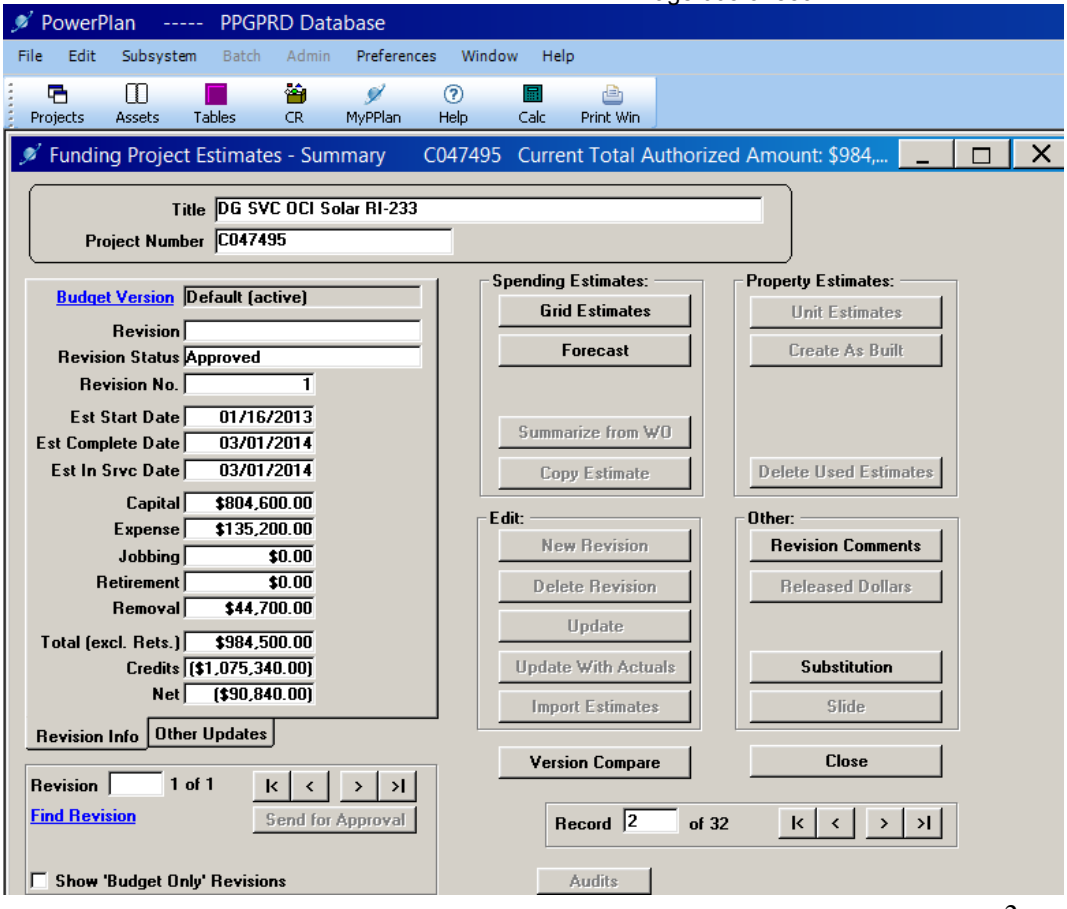
Related Projects:

Project Number: **Project Name:**

Approvals

Line 1:	**Date**	1/17/2013 16:43:50	**Approver**	sherir	Approver 1
Line 2:	**Date**		**Approver**		
Line 3:	**Date**		**Approver**		
Line 4:	**Date**		**Approver**		
Line 5:	**Date**		**Approver**		

*****Project Authorization is for Approved Revision Total Estimated Cost +10% *****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Funding Project Estimates - Summary C047495 Current Total Authorized Amount: $984,...
Title DG SVC OCI Solar RI-233
Project Number C047495
Budget Version Default (active)
Revision
Revision Status Approved
Revision No. 1
Est Start Date 01/16/2013
Est Complete Date 03/01/2014
Est In Srvc Date 03/01/2014
Capital $804,600.00
Expense $135,200.00
Jobbing $0.00
Retirement $0.00
Removal $44,700.00
Total (excl. Rets.) $984,500.00
Credits ($1,075,340.00)
Net ($90,840.00)
Revision Info
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Grid Estimates
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	Distributed Gen. Impact Study	Version 2 07/01/2012
Project	**RI-233a-OCI Solar Power** **Install 3000 kW PV Inverter Generation**	**Final**

This document has been redacted for Confidential Information.

System Impact Study
OCI Solar Power
Forbes St Landfill, East Providence, RI

3000 kW Three-Phase, Inverter Based Photovoltaic Generation

Interconnection to National Grid's 23kV System

nationalgrid	**DISTRIBUTION PLANNING DOCUMENT** **Interconnection Study**	**DOC.SP.RI-233a.3** Page 2 of 29
	Distributed Gen. Impact Study	Version 2 07/01/2012
Project	**RI-233a-OCI Solar Power** **Install 3000 kW PV Inverter Generation**	**Final**

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Project	**RI-233a-OCI Solar Power** **Install 3000 kW PV Inverter Generation**	**Final**

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1.0 Introduction

This document provides the results of the National Grid (the Company) the feasibility and distribution system impact study for the installation of 3000 kW, of three phase, inverter based, photovoltaic generation, located off Forbes St Landfill, in East Providence, RI. Refer to **Figure 1:** Site Diagram. The proposed generation will be served by National Grid's 23 kV subtransmission system in East Providence, RI. This document discusses the electrical installation requirements for this generating facility's interconnection to the Company's electric system.

The requirements specified herein are specific to this project only and are based upon the information submitted by the applicant, OCI SOLAR POWER, (the customer) at the time the interconnection application was submitted. Any design changes made by the applicant post application without National Grid's knowledge, review, and/or approval will render the findings of this report null and void.

2.0 Scope

The customer has submitted an application to interconnect an inverter based photovoltaic (PV) generating facility having a total capacity of 3000 kW. A new loadbreak switch, recloser, and 23kV Primary Metering Assembly will be installed at the generation site. The intent of this report is to assess the project's feasibility, determine its impact on the existing power system, and to determine interconnection scope and costs for interconnecting the facility to National Grid's power network. This report presents the results of the study and requirements and +/- 25% Planning Grade costs to interconnect with the National Grid local distribution system.

The following documents and references pertain to this project:

- R.I.P.U.C.NO 2078 cancelling R.I.PUC 2007. RI Standards for Interconnecting Distributed Generation
- IEEE 1547 – 2003 --IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems
- IEEE 1547.3 --IEEE Guide for Monitoring, Information Exchange, and Control of Distributed Resources Interconnected to Power Systems
- IEEE 1453-2004 --IEEE Recommended Practice for Measurement and Limits of Voltage Fluctuations and Associated Light Flicker on AC Power Systems
- National Grid Electric Service Bulletin ESB No. 750 – Specifications for Electrical Installations, April 2010 ("ESB 750") All ESB's are available at www.nationalgridus.com/electricalspecifications
- National Grid Electric Service Bulletin ESB No. 750 series Errata and Change Revision List, September 2010 ("ESB 750 Series Errata")
- ANSI C 84.1-2006 - American National Standard for Power Systems and Equipment Voltage Ratings (60 Hz)
- IEEE Standard C37.90.1-2002 …Standard Surge Withstand Capability (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus

3.0 Executive Summary

The customer has proposed an interconnection of a total of 3000 kW, of 3 Phase of PV based generation. The generator site utilizes six (6) Advanced Energy Solaron 500kW, 480V, three-phase inverters. The output of two (2) 500kW inverters is connected to a 23kV – 480Y/277V interface transformer rated at 1000 kVA. The three interface transformers site connect to medium voltage switchgear and a circuit breaker controlled by an SEL 351S relay. The switchgear is then connected to a customer owned, pole mounted, gang operated disconnect switch, and then to the Company's EPS via a primary metering assembly. This system will export power as it is proposed to be an independent power producer. Once all documentation has been received, National Grid will issue a request for a bidirectional meter that is adequate for net metering. The site is located at the Forbes St Landfill, East Providence, RI.

The project was found to be feasible and will be allowed to interconnect with certain modifications and additions to National Grid's facilities. The OCI Solar Power PV must operate at a specified power factor which is within the capability of the chosen devices.

OCI Solar Power commissioned National Grid to write this impact study to access the project's compliance with National Grid's requirements, IEEE standards, and RI R.I.P.U.C. 2078 tariff. Major findings are as follows:

1. The generating system may only normally generate onto the 2267 circuit and National Grid's Regional Control Center must first give permission to OCI Solar Power to allow the operation of their system. The generator may not be allowed to operate with the local electrical supply system (EPS) in an abnormal state. To ensure the safe and reliable operation of National Grid's EPS, National Grid may choose to disconnect the Customer at the PCC when abnormal system conditions develop and/or circuit reconfiguration takes place on the EPS.

2. National Grid will not be held liable for any power quality issues that may develop with any Customers as a result of the interconnection of this generation.

3. On the Customer's property, the 3000 kW interconnection point will be primary metered at 23 kV. At the point of interconnection, there will be a load break switch, a recloser, and one (1) primary metering assembly, owned and maintained by the Company.

   Directly after the primary metering assembly, the Customer will be required to install a dead-end pole to the Company's standards. The Company will frame the poles install dead-end conductors, anchors and guys. The Customer is to install their gang operated disconnects on

this pole and their primary riser. The Customer can make connections from their gang operated disconnect switches to the Company's conductors on the poles. The locations of Company owned facilities and the Customer's dead-end pole will be determined by the Company's field personnel. The Point of Common Coupling (PCC) will be at this Customer owned pole and will be designated as the Customer side of the aforementioned connections to the Company's primary conductors. The estimated cost for the Company's portion of this work is $150,000.

4. A 5,100 circuit ft 23 kV line extension of the 2267 circuit, composed of 1/0 AAC, will be built from pole 9303 Pawtucket Ave, down Willet, to pole 28 Forbes Rd. A loadbreak switch will be installed on pole 3 Willet and a recloser will be installed on pole 4 Willet. The estimated cost of the 2267 line extension is $744,000.00, not including tax liability.

5. The protection scheme submitted for review must meet National Grid's specific protection requirements. The Customer must agree to these requirements and submit a PE stamped one-line and required relay settings that meet all the requirements specified within this document, to National Grid for review and approval, before an interconnection agreement can move forward.

6. In order to minimize the impact of the proposed generation on the EPS and area Customers, National Grid will require that the reactive contribution of the PV interconnection be maintained at between 99% leading and lagging power factor at the PCC during the normal operation of the PV. In addition, the PV interconnection shall not contribute to greater than a 3.0% change in voltage on the EPS under any conditions.

7. National Grid will require an RTU system for real time monitoring, status, and control of the generators. This information is necessary for the safe and reliable operation of the distribution and transmission system. The control portion would only involve the remote trip and block closing of the customer's automated disconnect device. The customer will be responsible for making provisions on its end for standard data points to be sent to National Grid's Regional Control Center in Northborough, MA. A MPLS leased line will be required with ongoing cost paid by the interconnecting customer. A charge of $5,000.00 will be required for integration of the customer's RTU into the Company's EMS.

8. A Company approved witness test, estimated cost $2500 is required before parallel operation of any generation is authorized.

9. There is a $2,500 fee for protection settings review and confirmation.

10. The schedule of the interconnection is dependant on customer's ability to meet the requirements of this study, and in addition, procure the leased MPLS line from the provider for the RTU monitoring and control system back to National Grid's Regional Control Center in Northborough, MA and the required leased POTS line required by the ISO for revenue metering.

11. Total estimated known costs are **$1,075,340.00,** this includes **$90,840.00** in tax liability (**rate= 11.29%)**, which applies to **$804,600.00** in capital costs. There are also **$135,200.00** in O&M costs, which includes **$2,500.00** for witness testing, and **$44,700.00** in removal costs, refer to Section 9.0 Cost Estimates. For this specific interconnection application National Grid is able to provide this estimate as construction grade with a +or – 25% tolerance as specified by the tariff. This estimate will be deemed withdrawn if not accepted by the Customer within 90 days of receipt of the study.

4.0 Background

OCI Solar Power has proposed the installation of 3000 kW of inverter based generation located at the Forbes St Landfill in East Providence, RI, see **Figure 1**: Site Diagram. This interconnection will be supplied the 2267 circuit. This circuit originates from the Company's Mink St Substation, located in Seekonk, MA.

The 3000 kW site consists of six (6) Advanced Energy Solaron 500kW, 480V, three-phase inverters. The output of every pair of inverters is connected to a circuit breaker controlled by an SEL 351S relay. The Circuit breaker is connected to a 1000kVA, 23kV Delta – 480Ygrd/277V interface transformer. The 23kV side of the three interface transformer connects to a medium voltage switchgear with a 23kV circuit breaker controlled by an SEL 351S relay. The high side of the switchgear connects to a 600A, 15kV gang operated load break disconnect switch. The disconnect switch leads to National Grid's Revenue Meter and National Grid's Electric Power System (EPS). This system will export power as it is proposed to be an independent power producer. Once all documentation has been received, National Grid will issue a request for a bidirectional meter that is adequate for net metering. The site is located off Forbes St Landfill, East Providence, RI, refer to **Figure 2:** OCI Solar Power One Line.

4.1 Proposed Service Configuration and Point of Common Coupling (PCC)

This interconnection will require a 3 phase 23kV primary interface. The pole work and interconnection on private property will include a loadbreak switch, and a new pole mounted recloser, installed before one pole mounted primary metering assembly. **See to Figure 4:** Proposed Service Configuration. The

exact locations of the Company owned equipment will be determined by the Company's Design Personnel.

Directly after each primary metering assembly, the Customer will be required to install a deadend pole to The Company's standards. The Company will frame this pole and deadend its conductors on this pole and install and anchor and guy. The Customer is to install their gang operated disconnect on this pole and their primary riser. The Customer can make connections from their gang operated disconnect switch to The Company's conductors on that pole. The Point of Common Coupling (PCC) will be designated as the Customer side of the aforementioned connection. National Grid will install bi-directional meters once all required documentation has been received. The Company's Design Personnel will determine the exact location of the customer's dead end pole.

The 23 kV line extension on private property, intertie point, and associated primary metering will require easements. The easement will be the responsibility of OCI Solar Power to obtain in accordance with National Grid's specific requirements.

4.2 Distribution Circuit Connecting to OCI Solar Power DG

The 2267 is an existing 23 kV, 3 phase, 3 wire circuit, originating out of Mink St substation. The 2267 will be extended 5100 circuit ft from Pawtucket Ave to Forbes Rd and the generation site. The 23kV line extension will be composed of 1/0 AAC and will be built from pole 9303 Pawtucket Ave, down Willet, to pole 28 Forbes Rd. A loadbreak switch will be installed on pole 3 Willet and a recloser will be installed on pole 4 Willet. See **Figure: 3 2267 Line Extension**.

The ability to generate is contingent on being served by the 2267 circuit during normal operating conditions and circuit configuration. The Company reserves the right to disconnect the proposed generation whenever abnormal or adverse conditions develop, without prior notice to the generation owner.

After non-routine power outages or circuit reconfigurations, approval must be obtained by the Company's Regional Control center in Northborough, MA to return to generation mode.

4.3 Mink St Substation

The Mink St Substation is a 115kV/23kV/13.2kV distribution substation. The 23kV is supplied by Mink St T1, a 115 kV/23 kV/13.2 kV supply transformer. This transformer supplies the 2267 circuit and the 13.2kV bus 1 in a breaker and a half design arrangement. The 2267 circuit is unregulated.

5.0 Interconnection Analysis – Planning Issues

Many aspects of the OCI Solar Power interconnection and the area power system were studied and reviewed. Analysis was made on both the Company's Distribution and Transmission EPS. The study cases are:

a. Mink St 2267 2011 Peak load 5.2 MVA @ 99.8% PF with/without OCI Solar Power Generation.

b. Mink St 2267 2011 minimum load 2.48 MVA @ 94.6% PF with/without OCI Solar Power Generation.

The results of these case studies are covered in detail in the proceeding sections of this report. The circuit load values were chosen to correspond to the expected peak output of the proposed generator specifically between 1:00 PM and 3:00 PM.

5.1 General Thermal Analysis

Review of the circuit loading shows that the addition of 3000 kW of generation at OCI Solar Power, operating in parallel with the Mink St 2267, in the proposed configuration, will not create any thermal loading problems on the 2267, Mink St Substation or the transmission system. All National Grid owned mainline conductor and distribution and transmission facilities are large enough, thermally, to handle the capacity of the generation.

5.2 Wholesale Metering at Mink St Substation

The possibility of this interconnection causing reverse power flow on the 2267 line was reviewed. The maximum generation output exceeds peak loading on the 2267 line, therefore, the proposed generation will export power onto the Company's EPS on a routine basis. The existing bulk power metering on the 2267 line is bidirectional.

5.3 Voltage Regulation

The 2267 is an unregulated line, but, voltage levels are maintained between +/- 5% of nominal under normal conditions as required by ANSI C84.1-2006.

The Customer is responsible for designing and sizing its own on site distribution system and cabling to the generator to account for any voltage rise/drop on its system due to generation.

National Grid will require that the voltage at the PCC be maintained at between 95% and 105% of nominal. In addition, the PV interconnection shall not contribute to greater than a 3.0% change in voltage on the EPS under any conditions.

National Grid will not be held liable for any power quality issues that may develop with any Customers as result of the interconnection of this generation.

5.4 Reverse Power Flow

Maximum generation output exceeds peak loading on the 2267 line, therefore, the proposed generation will export power onto the Company's EPS on a routine basis.

5.5 Flicker Analysis

Flicker may arise due to variable loads and distributed generation resources. A voltage drop/ flicker evaluation was done for the OCI Solar Power project. This large project's voltage impact is of particular concern due to its size.

Analysis for this impact study has determined that if the reactive contribution of the PV at the Point of Common Coupling operates between 99% leading and lagging power factor during the operation of the PV the predicted flicker and voltage fluctuations are expected to be acceptable.

5.6 Power Revenue Meter Requirements

National Grid will specify, test, install, and own the voltage and current transformers necessary to meet the metering requirements for this project.

The Customer should provide an analog/POTS (Plain Old Telephone Service) phone line to each National Grid owned revenue meter location. The phone line must be capable of direct inward dial without human intervention or interference from other devices such as fax machines, etc. **Refer to Attachment 1:** Revenue Meter Installation Guide.

5.7 Reactive Demand – Power Factor Correction

Requirement: In order to minimize the impact of the proposed generation on the EPS and area Customers, National Grid will require that the reactive contribution of the PV interconnection be maintained at between 99% leading and lagging power factor at the PCC during the operation of the PV.

5.8 2267 Circuit Capacitor Banks

National Grid utilizes capacitor banks on its EPS for reactive compensation and voltage support. The 2267 has capacitors at the following locations:

Size	Location	Type
3000 kVAR	Kent Corners Substation	Switched Voltage– Three Phase Bank

Table 1: Capacitor Banks

The existing switched banks have controls with a voltage override function that will be utilized as a result of this interconnection. Analysis has determined that the existing fixed bank is too remote from the proposed generation to cause any voltage problems

6.0 Relay and Protection Review

National Grid performed a protection review of OCI Solar Power's proposed interconnection of an 3000 kW PV based photovoltaic generator to the 2267, a dedicated 23 kV distribution circuit served from Mink St substation. This review will identify system enhancements that may be necessary to complete the interconnection project and its ability to meet Rhode Island R.I.P.U.C. 2078 interconnection tariff and National Grid's specific requirements. The protection impact study will address the following items:

1. Assessment of Protection and Transfer trip requirements
2. Identification of substation modifications to accommodate interconnection of the generators.
3. Cost Estimate of Interconnection

6.1 Temporary Over-Voltages as a Result of DG in Feed

Overvoltage conditions are unlikely to develop because the Mink St, T1 is a three winding transformer where the 115 kV winding is configured Y grounded with a delta tertiary.

6.2 Fault Current Contributions

The following table shows the pre-project and post-project fault duties at Mink St 16 Substation and at the PCC:

Fault Description	23kV Substation Bus Fault Duty (Amperes)	23kV Point of Interconnection Fault Duty (Amperes)
Pre-Project:		
Three Phase	7357	NA
Single line to ground	5073	NA
Post- Project:		
Three Phase	7419	2590
Single Phase	5067	1532

Table 2: Fault Current

Post Project fault current contribution is based upon a Delta Primary, and Grounded Wye secondary Interface Transformers.

The short circuit study utilizing the equivalent model of the PV generation showed that no circuit breakers will become overdutied as a result of the proposed East Providence plant. The Customer is responsible for ensuring that their equipment is rated to withstand the available fault current.

6.3 Disconnect Switch

The Facility shall provide a disconnect switch (or comparable device mutually agreed upon by the Parties) at the point of Facility interconnection that can be opened for isolation. The switch shall be in a location easily accessible to Company personnel at all times.
The switch shall be gang operated, have a visible break when open, be rated to interrupt the maximum generator output and be capable of being locked open, tagged and grounded on the Company side by Company personnel. The visible break requirement can be met by opening the enclosure to observe the contact separation. The Company shall exercise such right in accordance with Section 7.0 of the interconnection tariff.

The OCI Solar Power Project is using a lockable, 25kV, 3 phase, gang operated disconnect switch at each PCC. OCI Solar Power must provide National Grid with 24/7 unlimited access and control of this switch.

6.4 Unintentional islanding

The Customer's generation facility will not be permitted to energize a de-energized Company circuit. The IEEE 1547 states that anti-islanding protection is required for parallel generation on the EPS.

Detailed analysis indicates that the ability of this facility to island is unlikely.

6.5 Direct Transfer Tripping

A direct transfer tripping system, if one is required by either the Interconnecting Customer or by the Company, shall use equipment generally accepted for use by the Company and shall, at the option of the Company, use dual channels.

DTT is not required for this installation.

6.6 Interconnection Interrupting Device

An interconnection Interrupting Device such as a circuit breaker shall be installed to isolate the Facility from the Company's EPS. If there is more than one Interrupting Device, this requirement applies to each one individually. The Interconnection Interrupting Device must be capable of interrupting the current produced when the Facility is connected out of phase with the Company's EPS, consistent with Section 4.1.8.3 of IEEE Standard 1547-2003 which states, "the interconnection system paralleling-device shall be capable of withstanding 220% of the interconnection system rated voltage."

Meets requirement: The project is proposing to install a 23kV pad-mounted switchgear after the PCC.

6.7 Synchronizing Devices

The Generation is inverter based no synchronizing device required.

6.8 Transformers

The Company reserves the right to specify the winding connections for the transformer between the Company's voltage and the Facility's voltage (Interface Transformer) as well as whether it is to be grounded or ungrounded at the Company's voltage.

The project is proposing to install three (3) transformers, rated 1000kW, 23kV delta – 480Y/277V. This interconnection is to be made on National Grid's 2267 circuit, a not effectively grounded, 23kV, three (3) wire, subtransmission circuit. On such circuits, National Grid requires that all interface transformers be configured delta primary and Wye grounded secondary.

Meets requirement

6.9 Voltage relays

Voltage relays shall be frequency compensated to provide a uniform response in the range of 40 to 70 Hz.

See transformer requirements in section 6.8. The Customer needs to install Yg/Yg PTs on the Primary winding to provide voltage detection for undervoltage detection, (27) element, and zero sequence overvoltage protection (59N) element, which will trip the high side interrupting device.

One-Line meets requirement.

6.10 Overcurrent Relays

See transformer requirements in section 6.8. Over current protection is required on the low voltage side of the Customer's interface transformer.

Meets requirement.

6.11 Protective Relaying Redundancy

The protective relays utilized by this Facility shall be sufficiently redundant and functionally separate so as to provide adequate protection, consistent with Company practices and standards, upon the failure of any one component

The relays at the inverter terminal shall provide the redundant protection for voltage and frequency elements. However, the relay equipped for overcurrent protection has no redundancy, National Grid requires that the relay alarm contact should be wired to trip the switchgear when the relay fails, not in service or the DC supply voltage to the relay is lost. There will be 2s time delay in tripping the switchgear. A timer needs to be added to the switchgear's trip circuit. .

One-line must be updated to meet the above requirement

6.12 Protective Relay Hard-Wire Requirement:

Unless authorized otherwise by the Company, protective relays must be hardwired to the device they are tripping. Further, interposing computer or programmable logic controller or the like is not permitted in the trip chain between the relay and the device being tripped.

The interconnecting relay should be hardwired to the interconnecting interrupting device at the point of interconnection. There should be no interposing programmable logic controller in the trip circuit.

Meets requirements.

6.13 Protective Relay Supply

Interconnection interrupting devices shall have DC trip coils and tripping energy shall be derived from station batteries. Battery voltage, capacity specifications, and charging system provisions are subject to approval by the Company.
Control circuits associated with protective relays shall be DC powered from a battery and battery charger system. The battery shall be the sole source of tripping energy. Solid state relays shall be self-powered or DC powered from a battery and battery charger system.

If the generating facility uses a Company approved non-latching interconnection contactor, AC powered relaying may be allowed provided the relay as well as its method of application are fail-safe, meaning that if the relay fails or if the voltage and/or frequency of its AC power source deviate from the relay's design requirements for power, the relay or a separate fail-safe power monitoring relay acceptable to the Company will immediately trip the generator by opening the coil circuit of the interconnection contactor

Meets requirement.

6.14 Current Transformers ("CT")

CT ratios and accuracy classes shall be chosen such that secondary current is less than 5 amperes and transformation errors are consistent with Company practices.

Current one-line meets this requirement.

6.15 Voltage Transformers ("VT") and Connections

The Facility shall be equipped with a direct voltage connection or a VT, connected in accordance to National Grid's requirements. The DG Customer is responsible for over voltage detection and the detection of line-to-ground faults on the primary and secondary sides of the step-up transformer as well as the Company's EPS.

The Customer's one-line has Yg/Yg PTs on the Primary winding to provide voltage detection for undervoltage detection, (27) element, and zero sequence overvoltage detection, (59N) element, which will trip the high side interrupting device.

6.16 High-Speed Protection

The Facility may be required to use high-speed protection if time-delayed protection would result in degradation in the existing sensitivity or speed of the protection systems on the Company's EPS.

High speed protection is not required.

6.17 Surge-Withstand capability

The interconnection system shall have the capability to withstand voltage and current surges in accordance with the environments defined in IEEE Standard C62.41.2-2002 or IEEE Standard C37.90.1-2002 as applicable.

6.18 Additional Requirement

.R.I.P.U.C. No. 2078, requires that, the Distributed Resources (DR) cease to energize the area EPS within specific clearing times , refer section 4.2.3, Table 1, Interconnection system response to abnormal voltages, and section 4.2.4, Table 2 – Interconnection system response to abnormal frequencies. Section 4.2.3.2.1 requires that NPCC A-03 Curve be followed. It is important that clearing time should be the time that the relay trips plus breaker operating time.

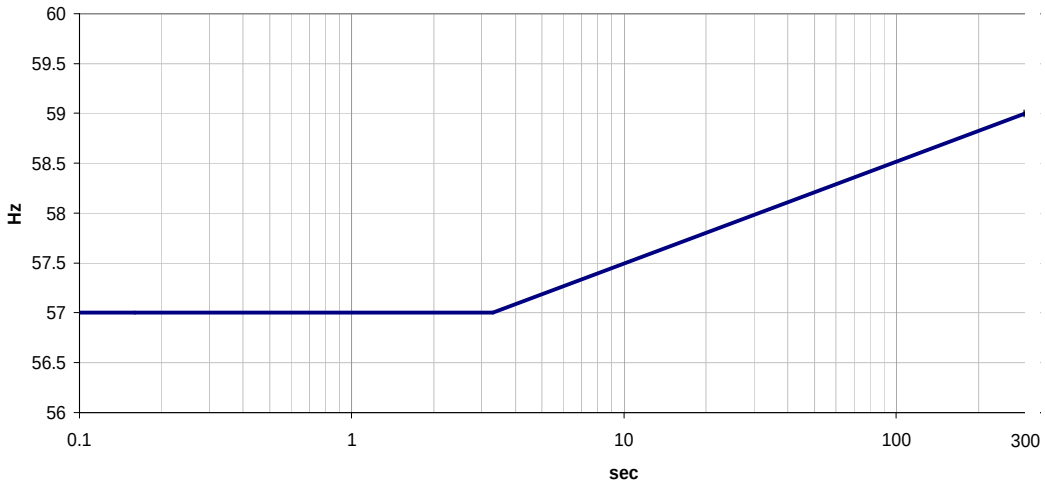


Table 3: NPCC-A- 03 Curve

6.19 Protection Scheme Assessment

The present protection scheme submitted for review must be modified to show meet National Grid's specific protection requirements. The Customer must submit a PE stamped one line and required relay

settings, which meets all the requirements specified within this document, to National Grid for review and approval before an interconnection application can move forward.

7.0 Generator Monitoring & Status

National Grid requires real time monitoring and reporting of generation data for this project per the recommendations of IEEE 1547.3 IEEE Guide for Monitoring, Information Exchange, and Control of Distributed Resources Interconnected with Electric Power Systems.

- Communication to National Grid's EMS will be in DNP protocol over a MPLS circuit; MPLS allows EMS to funnel data to both primary and back-up systems simultaneously. National Grid will assign the RTU a DNP slave id.
- The Customer is responsible to secure a Multiprotocol Label Switching (MPLS) connected to National Grid's new network through the Customer's Verizon representative. National Grid will supply a default MPLS default serial configuration to the Customer's RTU. The Customer is responsible to configure its RTU communications.
- The MPLS circuit will require the Customer to purchase a GarrettCom Magnum DX940 Industrial Router with the following specifications:
    - DX940-4RJ-H, base unit with four RJ45 10/100 Ethernet ports (Slot B), 90-250Vdc/ac power supply.
    - DXC-4SERIAL, four RS13.22/RS485/RS422 software selectable serial ports (Slot D).
    - DXC-DDS, DDS WAN port (Slot C)
    - ACC-DX-00-RRM, reverse rack mount bracket.
    - MNS-DX-SECURE, licensed software.
    - MNS-DX-ADVAR, advanced routing software.

Notes:

- DIN rail mounting brackets, if required, part ACC-DX-00-DM

- The Customer's RTU system needs to be capable of updating EMS as follows: Status - every 2 seconds, Analogs - every 4 seconds, Full scan of all points - every 3 minutes. Scaling of analog points will be in engineering units; scaling is done during the commissioning process with National Grid's EMS.
- The required analog and status points are listed in the Telemetry Requirements (see below).
- Unless the Customer's breaker status can be read over a dedicated RS485 serial connection to local protective relays, the individual breaker status will be required to be hard wired to an IO module.
- RTU power is to be supplied by a battery and battery charger system capable of keeping the system on line for a minimum of eight (8) hours in the event main power is lost.

- The generation Customer will own, operate and maintain: all related RTU equipment and the MPLS communication line.
- Recommended RTU's include, but are not limited to, the following:
  - GE IBOX http://www.gedigitalenergy.com/multilin/energy/catalog/ibox.htm
  - Cooper-SMP-4 http://www.cooperindustries.com/content/public/en/power_systems/products/automation_and_control/smp_products/smp_4_dp_gateway.html ;With wall mount IO http://www.cooperindustries.com/content/public/en/power_systems/products/automation_and_control/smp_products/smp_i_o.html
  - Televent Sage http://www.telvent.com/en/business_areas/smart_grid/solutions_overview/smart_grid/smart_networks/sage-rtu.cfm
  - Schneider Electric Ion http://products.schneider-electric.us/products-services/products/power-energy-monitoring-system/network-communications/remote-terminal-units/ion7550-rtu/
  - Novatech Orion LX Renewable http://www.novatechweb.com/utility/orionlx/

- Due to the need for remote trip and block closing, National Grid requires that the Customer must ensure that the RTU is purchased with the Control I/O necessary to support remote tripping by National Grid EMS.
-

7.1 Telemetry Requirements

The RTU will be required to report the following:

- Status of individual generator breakers
- Status of main or interconnect breaker (on a case-by-case basis)
- Three phase line current for each generator
- Three phase line current at the point of connection with National Grid.
- Three phase line-to-line voltage for each generator
- Three phase line-to-line voltage at the point of connection with National Grid.
- Output KW for each unit (+ delivered to NGRID, - received)
- Output KVAR for each unit (+ delivered to NGRID, - received)
- Total MW (+ delivered, - received)
- Total MVAR (+ delivered, - received)

The RTU will also be required to support remote tripping of the Customer's automated disconnect device using on-board Control Points. The DG Customer shall notify the Company with 10 days in advance of telecommunications circuit installation to coordinate programming of the Company's EMS with the Customer's RTU. The Company's EMS internal review and coordination will cost $5,000.

8.0 Inspection, Compliance Verification, Customer Testing, and Energization Requirements.

8.1 Inspections and Compliance Verification

For this study, the DG Facility is deemed as an Independent Power Producer pursuant to applicable RI state jurisdictional requirements. A municipal electrical inspection approval certificate from the local authority having jurisdiction is required of the DG Customer's facilities (i.e. primary service entrance conduit, primary switchgear, wiring, and generation equipment). The Company must receive the DG Customer's final set of installation drawings, equipment data, and test plan for the functional verification tests at least four (4) weeks before the Company's field audit.

The DG Customer shall adhere to all other Company related verification and compliance requirements as set forth in the applicable ESB 750 series documents. These and documented acceptance testing requirements of these facilities will be specified during the final design review of the Project prior to the Company's field audit and energization.

8.2 Testing and Commissioning

The DG Customer will submit initial relay settings to the Company no later than twenty-one (21) calendar days following the Company's acceptance of the DG Facility's service connection's final RI state licensed professional engineer sealed design. If changes/updates are necessary, the Company will advise the DG Customer three (3) business days after the initial relay settings were received. The DG Customer shall submit within seven (7) calendar days the finalized relay settings to the Company. The DG Customer will be advised by the Company within three (3) business days on the acceptance of the final relay settings. If the process must continue beyond the above evolution due to errors in the relay settings, the Company retains the right to extend the Testing and Commissioning process as necessary to ensure the final relay settings Testing and Commissioning Plan (TCP) are correct.

Assuming no major issues occurring with the relay settings, the DG Customer shall submit a Testing and Commissioning Plan (TCP) to the Company for review and acceptance, no later than forty-five (45) calendar days following the Company's acceptance of the DG Customer Attachment Facilities station's

final design. The TCP must be finalized, including Company acceptance, no later than six (6) weeks prior to functional testing and will be specified during the final design review of the Project.

8.3 Energization and Synchronization

The "Generator Disconnect Switch" at the interconnection point shall remain "open" until successful completion of the Company's field audit and witness testing.

Prior to the start of construction, the DG Customer shall designate an Energization Coordinator (EC), and prepare and submit an Energization Plan (EP) to the Company for review and comment. The energization schedule shall be submitted to the Company and communicated with the Company's local Regional Control Center at least two (2) weeks in advance of proposed energization. Further details of the EP and synchronization requirements will be specified during the final design review of the Project.

The DG Customer shall submit as-built design drawings to the Company 90 days following commercial operation of their DG Facility.

9.0 Cost Estimates

The following are general descriptions of, and non-binding good faith Planning Grade estimates for National Grid components of work to accommodate this generation.

National Grid Work Item	Conceptual Cost +/-25% Planning Grade Cost Estimate not including Tax Liability				Associated Tax Liability $ @ Applied to capital 11.29%	Total Customer Costs includes Tax Liability on Capital Portion
	Total $	Capital	O&M	Removal		
On private property at the generation site, a loadbreak switch, a recloser and one 23 kV primary metering assembly will be installed	$150,000 00	$135,000.00	$7,500.00	$7,500.00	$15,242.00	$165,242.00
Tap 2267 pole 9303 Pawtucket Ave, install loadbreak P3 Willet and Recloser on pole 4 Willet. Extend 2267 5100 Cirt Ft (1/0 AAC0 down Willet to Forbes down to pole 28 Forbes	$744,000 00	$669,600.00	$37,200.00	$37,200 00	$75,598.00	$819,598.00
Witness Testing	$2,500.00	$0.00	$2,500.00	$0.00	$0.00	$2,500.00
EMS Integration	$5,000.00		$5,000.00			$5,000.00
Protection Setting Review	$2,500.00		$2,500.00			$2,500.00
Project Management	$80,500.00		$80,500.00			$80,500 00
Totals	**$984,500.00**	**$804,600.00**	**$135,200.00**	**$44,700.00**	**$90,840.00**	**$1,075,340.00**

Table 4: +/- 25% Planning Grade Estimates

1. These are Planning Grade estimates with a targeted accuracy of +/- 25%. They were developed with a generalized understanding of the project and based upon information both provided by the Interconnecting Customer in the interconnection application and collected in the field. They are prepared using historical cost data, data from similar projects, and other assumptions. The estimate will be deemed withdrawn if not accepted by the Customer within 90 days of receipt of this study.

2. The associated tax effect liability is the result of an IRS rule, which states that all costs for construction collected by National Grid, as well as the value of donated property, are considered taxable income. Current tax effect rate is 11.29 % for Rhode Island Electric Co assets.

10.0 Conclusion

The project was found to be feasible but with system impacts which can be mitigated. It will be allowed to interconnect with certain modifications and additions to the local National Grid system as well as on the Customer's equipment.

Due to the company's internal project review procedure, a detailed Facility Study with +/- 10% estimates will be required at an additional charge whenever cost estimates, minus the tax liability, exceed $500,000.00. Once a final design is completed and all associated applications, fees, permitting and easement requirements are satisfied work for this project will be placed in queue for construction. The schedule for National Grid's work will be addressed during or after the execution of an Interconnection Agreement.

The Customer shall provide a response to proceed in no longer than 15 days, or half the time allotted to the Company to perform the given step. If the Customer fails to respond with that time frame, the Company will be forced to consider this application no longer active, and in turn, it will be cancelled because the customer failed to respond in a timely manner per requirements in the Standards for Interconnection Distributed Generation R.I.P.U.C No 2078, Section 3.4 Time Frames:

Parallel operation of any generation is not authorized until the Agreement is executed with the necessary insurance documentation and the Company approved witness test has been completed. Upon successful completion of the witness test and the other necessary acceptable paperwork, the Company will send written permission to allow parallel operation.

11.0 Revision History

Version	Date	Description of Revision
1.0	7/31/2012	V.01 Final for RI-233a OCI Interconnection Project
2.0	8/2/2012	V.02 Final for RI-233a OCI Interconnection Project changed time delay in section 6.1 from 30 s to 2 s

	DISTRIBUTION PLANNING DOCUMENT Interconnection Study	DOC.SP.RI-233a.3
nationalgrid	Distributed Gen. Impact Study	Version 2 07/01/2012
Project	RI-233a-OCI Solar Power Install 3000 kW PV Inverter Generation	Final

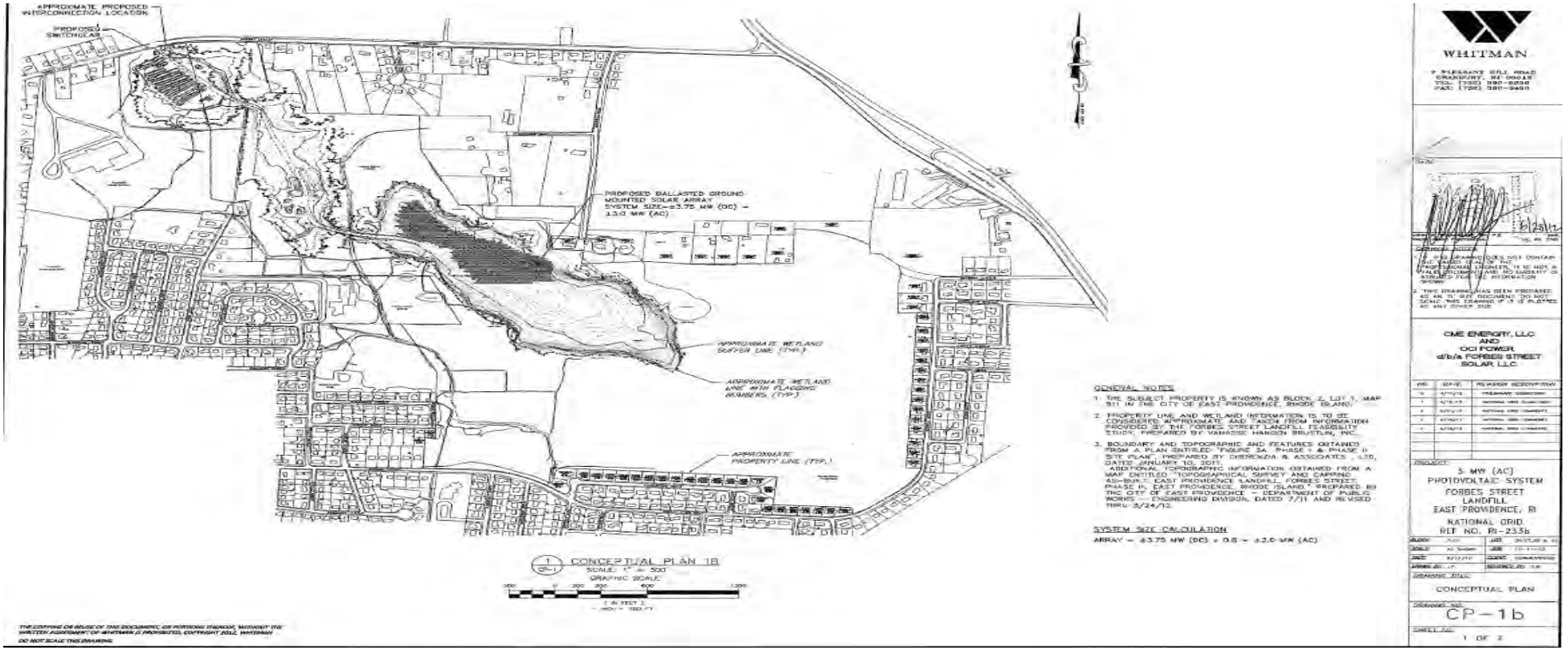


Figure 1 - Site Plan

nationalgrid	**DISTRIBUTION PLANNING DOCUMENT** **Interconnection Study**	**DOC.SP.RI-233a.3**
	Distributed Gen. Impact Study	Version 2 07/01/2012
Project	**RI-233a-OCI Solar Power** **Install 3000 kW PV Inverter Generation**	**Final**

[redacted]

nationalgrid	**DISTRIBUTION PLANNING DOCUMENT** **Interconnection Study**	**DOC.SP.RI-233a.3**
	Distributed Gen. Impact Study	Version 2 07/01/2012
Project	**RI-233a-OCI Solar Power Install 3000 kW PV Inverter Generation**	**Final**

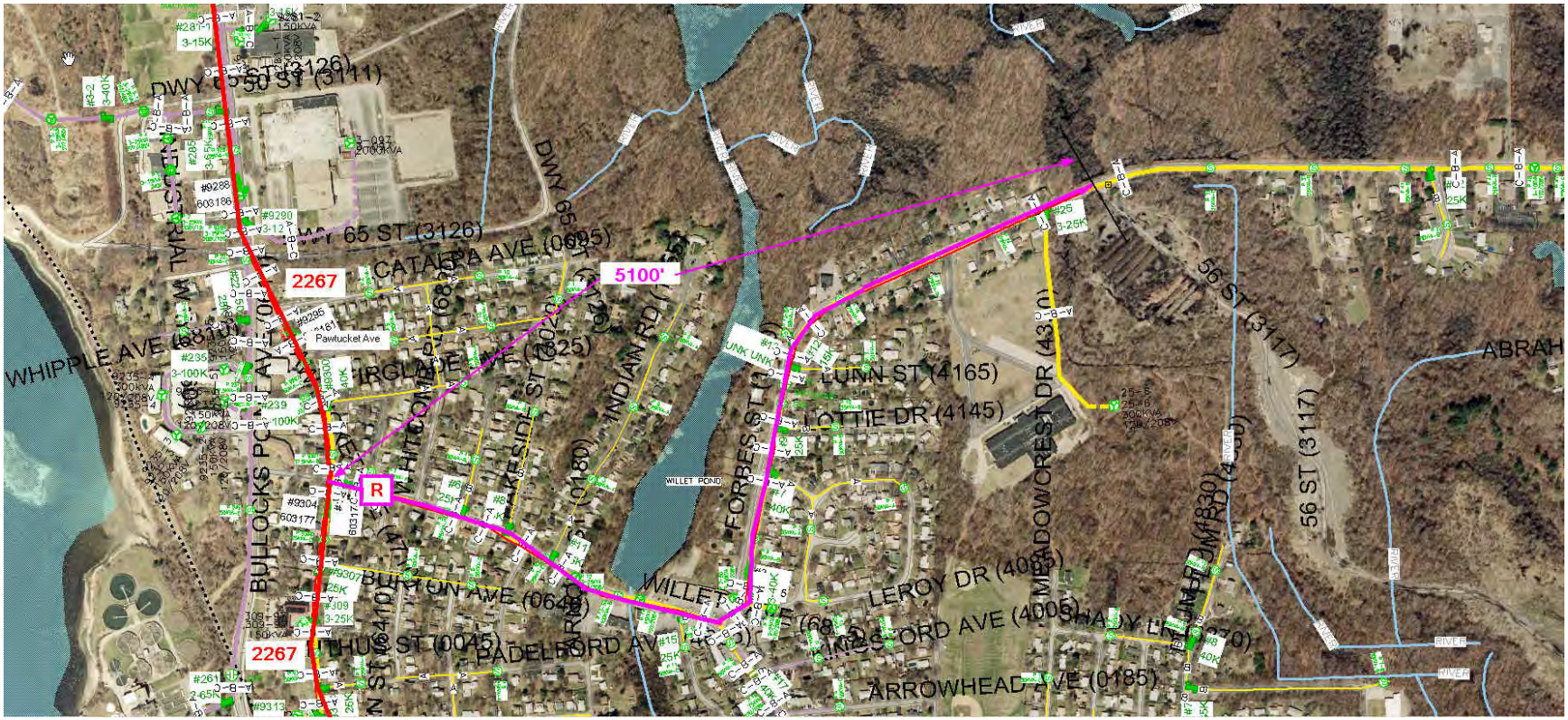


Figure 3 - 2267 Extension

	DISTRIBUTION PLANNING DOCUMENT Interconnection Study	DOC.SP.RI-233a.3 Page 26 of 29
nationalgrid	Distributed Gen. Impact Study	Version 2 07/01/2012
Project	RI-233a-OCI Solar Power Install 3000 kW PV Inverter Generation	Final

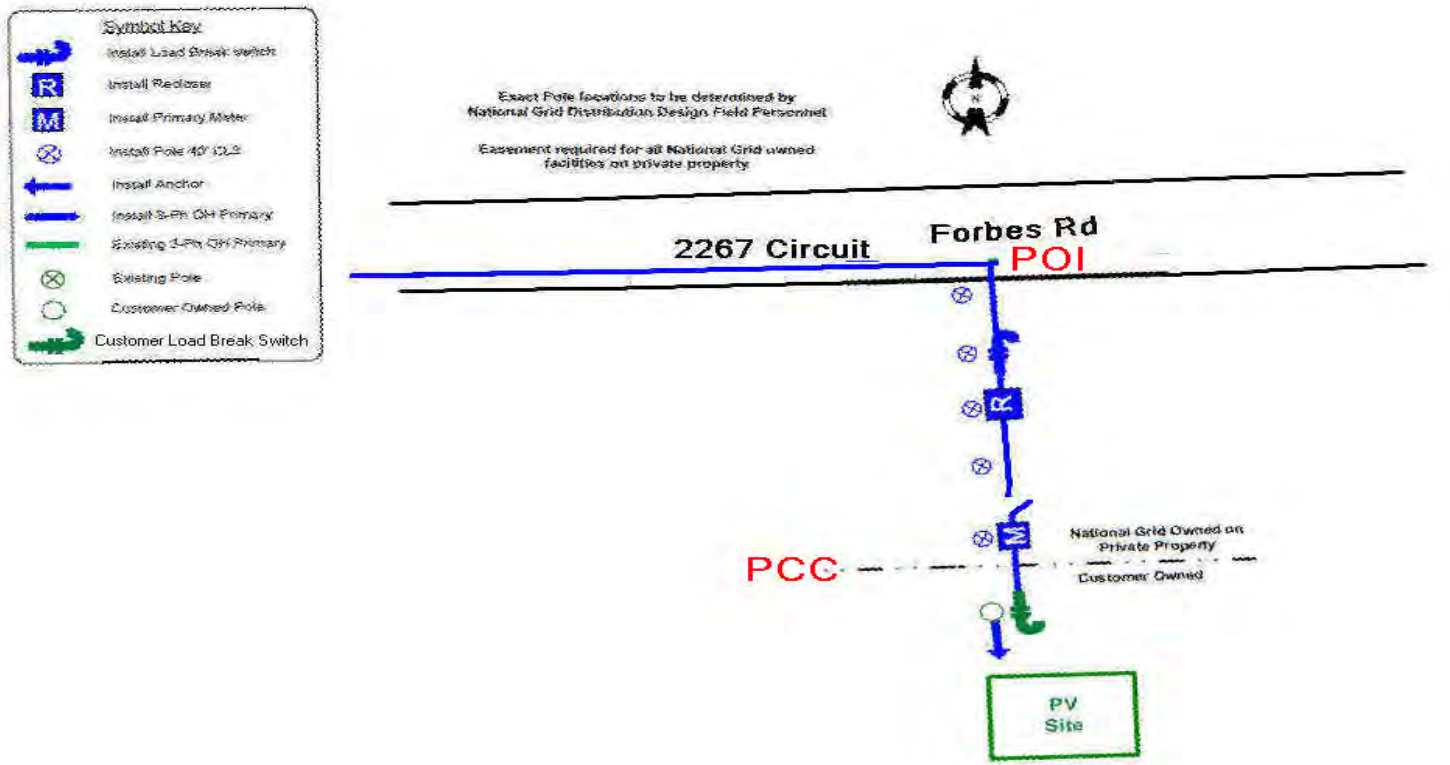


Figure 4 Company Facilities on Private Property

Attachment 1: Revenue Metering Phone Line Installation Guide

REVENUE METERING PHONE LINE INSTALLATION GUIDE

An analog phone line to National Grid's revenue meter shall be provided by the Customer. The analog phone line must be capable of direct inward dial without human intervention or interference from other devices such as fax machines, etc. The phone line can be a phone (extension) off the customers PBX phone system, or it may be a separate dedicated phone line as provided by the Telephone Company. The following is to be used as a guide, please contact the Company if additional information is required. The most common installations are outlined below, Wall mounted Meter Installation, Outdoor Padmount Transformer Meter Installation, and Outdoor Pole Mounted Meter Installation.

1) WALL MOUNTED METER INSTALLATION

If the meter is wall mounted indoor or outdoor the customer shall provide a telephone line within 12" of the meter socket and additional equipment as described and shown below in figures 1A & 1B. National Grid will connect the meter to the customer provided phone line.

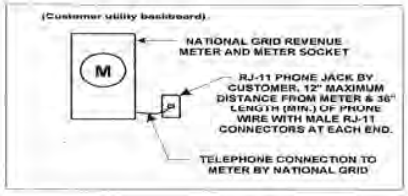


Figure 1A – Indoor Meter Installation
not to scale

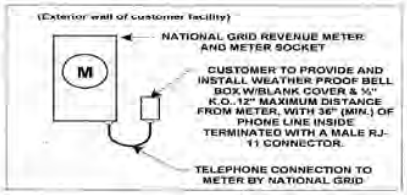


Figure 1B – Outdoor Meter Installation
not to scale

2) OUTDOOR PADMOUNT TRANSFORMER METER INSTALLATION

If the meter is mounted outside on the secondary compartment of the padmount transformer as shown below the conduit shall stub up and roughly line up with the bottom or side knock out of the meter socket and terminate into a weatherproof box or fitting. A liquid tight flexible conduit whip with end bushing and locknut of sufficient length to reach and terminate at the knockout location of the meter socket with three feet of telephone wire coiled (and terminated with a male RJ-11 connector) at its end shall be connected to the weatherproof box or fitting. National Grid will connect the conduit whip to the meter socket and terminate the telephone wire to the meter (see figure 2 below).

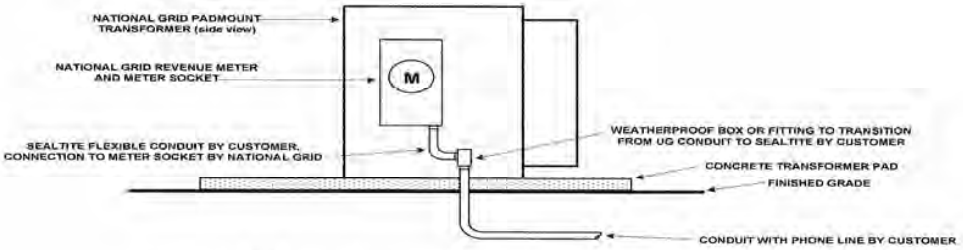


Figure 2 – Outdoor Padmount Transfomer Meter Installation
not to scale

(1 of 2)

Attachment 1: Revenue Metering Phone Line Installation Guide

3) If the meter is located outdoor on a Company owned utility pole as part of a primary metering installation the Company will install and connect a phone line from the Telephone Company provided termination box. The customer is responsible for the Telephone Company phone line installation. (see figure 3 below).

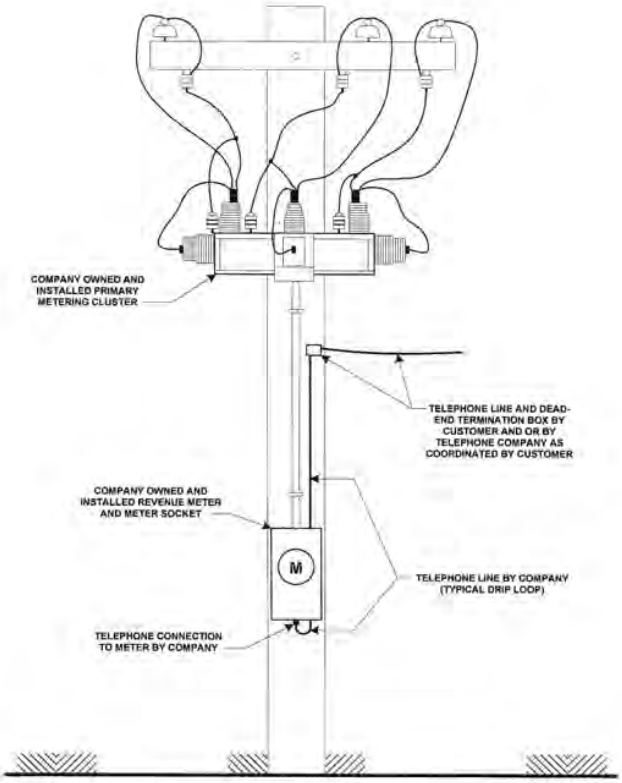


FIGURE 3 – POLE MOUNTED PRIMARY METER INSTALLATION
NOT TO SCALE

(2 of 2)

nationalgrid	**DISTRIBUTION PLANNING DOCUMENT** **Interconnection Study**	**DOC.SP.RI-233a.3** Page 29 of 29
	Distributed Gen. Impact Study	Version 2 07/01/2012
Project	**RI-233a-OCI Solar Power** **Install 3000 kW PV Inverter Generation**	**Final**

C048596

Kents Corner - Replace VRs

5360-Narragansett Electric and Gas
Project Revision Detail Report

Fund Project Number: C048596 **USSC #:**

Revision: 3 **Budget Version:** Default

Project Title: Kents Corner - Replace VRs

Project Description: This is a project to replace the 47J4 and 47J1 voltage regulators per the voltage regulator strategy on an opportunistic basis. There is a summer prep 2013 project to replace the 47J3 regulator PFN CO46662. They will be completed together.

Project Status: Closed

Responsible Person: NEARY, ALEXANDER **Initiator:** Duarte, Eileen M

Spending Rationale: Asset Condition **Funding Type:** P Electric Distribution Sub RI

Budget Class: Asset Replacement

Capital by Category:

Program Code:

Project Risk Score: 28 **Project Complexity Score:** 12

Project Schedule / Expenditures

Revision Status: Approved

Est Start Date: 3/15/2013 **Est Complete Date:** 3/31/2014

Est In-Service Date: 3/31/2014

TTD Actuals: $257,460 **As Of:** 10/3/2017

Cost Breakdown	Capital	Expense	Removal	Total	Credits
	$222,900	$19,000	$2,500	$244,400	$0

Justification / Risk Identification:

The voltage regulators at this station are GE and Westinghouse IRT/IRS induction type regulators which are targeted for replacement on an opportunistic basis under the approved Voltage Regulator Strategy. Presently, there is a summer prep project, PFN C046662, to replace one of the three voltage regulators on the 47J3 feeder. In addition, the 47J4 is leaking oil. This is an opportunity to replace the remaining two regulators.

Project Scope:

Replace the 47J4 and the 47J1 3-phase voltage regulators in coordination with the replacement of the 47J3 voltage regulator. These are one-one replacements and will be replaced with modern step type voltage regulators.
The scope was expanded during step 3 from regulator replacements to the following additional scope: three 23kV disconnects, six 23kV bus arrestors, 14 crossarms at the 23kV level, three 4kV regulator bypass disconnects, and one regulator foundation. This added material cost ($30k), construction labor ($65k), contractor costs ($5K) and nominal additional costs($10k).

Project Alternatives Considered:

<Enter data here>

Additional Notes:

Re-Sanction from $134,400 to $244,400 from Alex Neary. The scope was expanded during step 3 from regulator replacements to the following additional scope: three 23kV disconnects, six 23kV bus arrestors, 14 crossarms at the 23kV level, three 4kV regulator bypass disconnects, and one regulator foundation. This added material cost ($30k), construction labor ($65k), contractor costs ($5K) and nominal additional costs($10k).

Increase DOA to cover the following additional scope: three 23kV disconnects, six 23kV bus arrestors, 14 crossarms

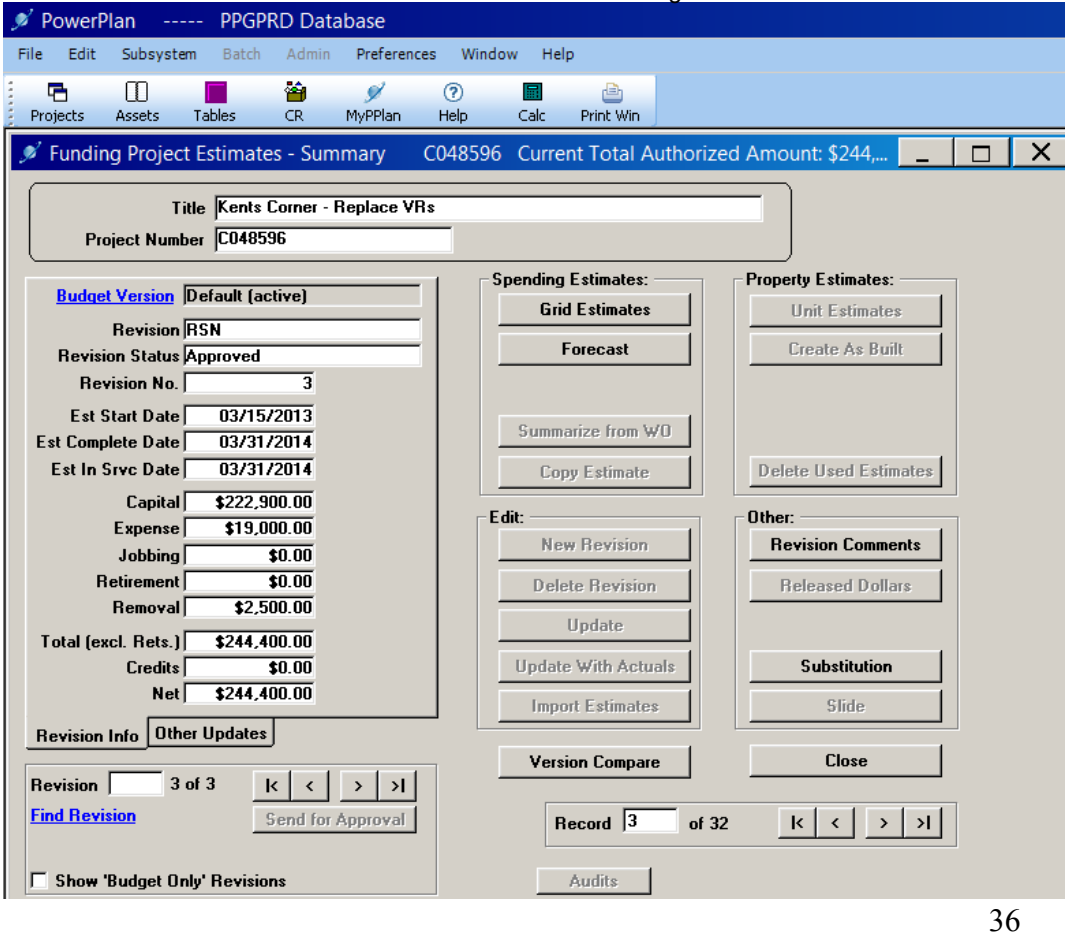
Related Projects:

Project Number:	Project Name:

Approvals

Line 1:	**Date**	12/16/2013 07:24:23	**Approver**	labara	Approver 1
Line 2:	**Date**		**Approver**		
Line 3:	**Date**		**Approver**		
Line 4:	**Date**		**Approver**		
Line 5:	**Date**		**Approver**		

*****Project Authorization is for Approved Revision Total Estimated Cost +10% *****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Title Kents Corner - Replace VRs
Project Number C048596
Budget Version Default (active)
Revision RSN
Revision Status Approved
Revision No. 3
Est Start Date 03/15/2013
Est Complete Date 03/31/2014
Est In Srvc Date 03/31/2014
Capital $222,900.00
Expense $19,000.00
Jobbing $0.00
Retirement $0.00
Removal $2,500.00
Total (excl. Rets.) $244,400.00
Credits $0.00
Net $244,400.00
Revision Info
Other Updates
Revision 3 of 3
Find Revision
Send for Approval
Show 'Budget Only' Revisions
Spending Estimates:
Grid Estimates
Forecast
Summarize from WO
Copy Estimate
Property Estimates:
Unit Estimates
Create As Built
Delete Used Estimates
Edit:
New Revision
Delete Revision
Update
Update With Actuals
Import Estimates
Other:
Revision Comments
Released Dollars
Substitution
Slide
Version Compare
Close
Record 3 of 32
Audits

Project Sanction/Re-Sanction Form

Version 8.4

Note: Fill data in the grey area and email form to **Mario Carlino** and the appropriate IP analyst.
Gas - Tracy Nguyen
Distribution - Janice Flynn
Transmission - Matt Roby

*Date:	12/4/2013
*Operating Company:	The Narragansett Electric Co.
*PowerPlant Project Id:	C048596
*Project Name:	Kents Corner- Replace Two Voltage Regulators
Project Engineer:	Daniel Falla
Project Manager:	Alexander Neary

Original Project Estimate

*Date of Original Sanction:	3/18/2013

Total	Capex	Opex	Removal
$134,400	$120,000	$2,400	$12,000

Revised Project Estimate

Total	Capex	Opex	Removal
$244,400	$222,900	$19,000	$2,500

Cash Flows

Previous FY	Capex	Opex	Removal
$0	$0	$0	$0

Current FY	Capex	Opex	Removal
$244,400	$222,900	$19,000	$2,500

FY+1	Capex	Opex	Removal
$0			

FY+2	Capex	Opex	Removal
$0			

Customer Contribution

Reason for Revision

☑	Revised forecast either exceeds or is lower than the Approved Amount - Project Still In Process
	New Project Estimated Completion Date: 3/31/2014
☐	Actual Spending either exceeds or is lower than the Approved Amount – Project is Complete

Reason for Increased Spending (Please expand the row height if box doesn't fit)

☑	**Change in Scope (Material, Labor or Other)**

Project Sanction / Re-Sanction Form

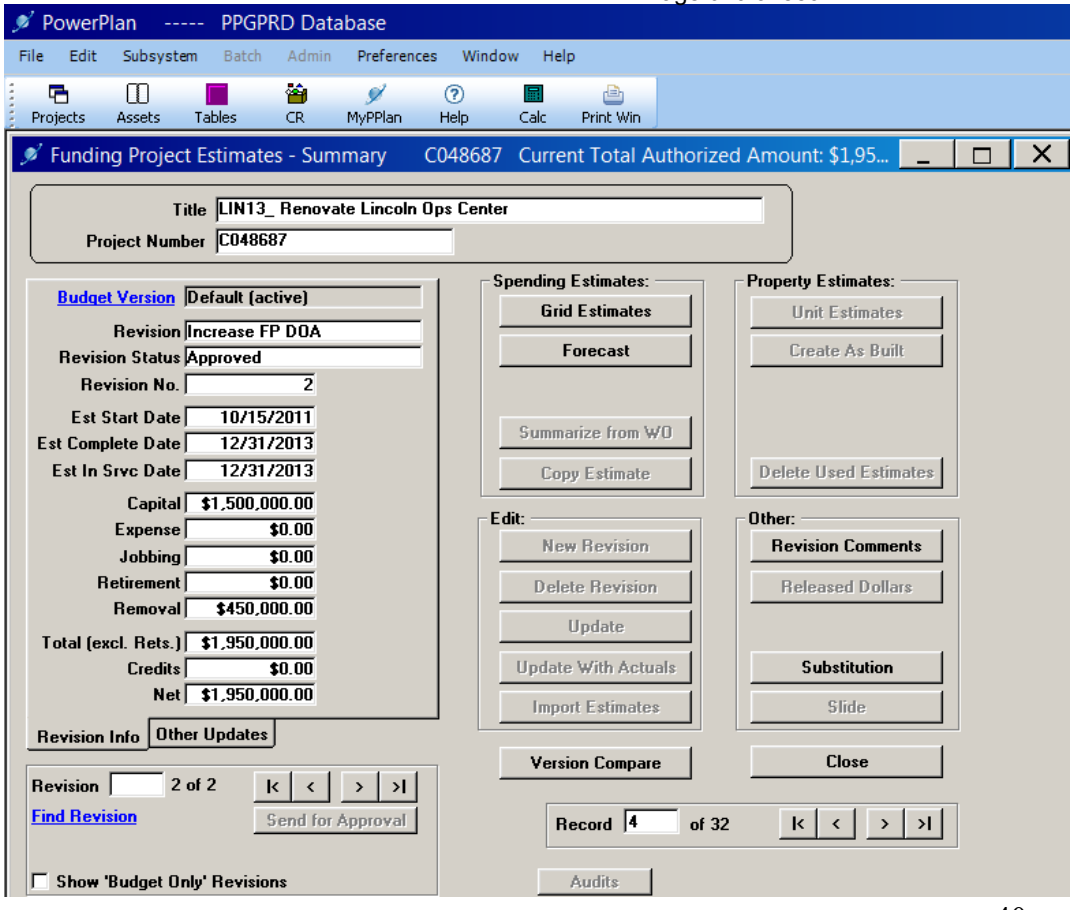
	The scope was expanded during step 3 from regulator replacements to the following additional scope: three 23kV disconnects, six 23kV bus arrestors, 14 crossarms at the 23kV level, three 4kV regulator bypass disconnects, and one regulator foundation. This added material cost ($30k), construction labor ($65k), contractor costs ($5K) and nominal additional costs($10k).
☐	**Resource Allocation (Schedule, Delay, OT, or Contractor)**
☐	**Low / High Estimate**
☐	**External Forces (Permitting Requirements, Weather, Contractor Issues, etc)**

In-service Dates

*Original In-service Date:	6/21/2013
*Revised In-service Date:	6/21/2013

C048687

LIN13_ Renovate Lincoln Ops Center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Project Number C048687
Budget Version Default (active)
Revision Increase FP DOA
Revision Status Approved
Revision No. 2
Est Start Date 10/15/2011
Est Complete Date 12/31/2013
Est In Srvc Date 12/31/2013
Capital $1,500,000.00
Expense $0.00
Jobbing $0.00
Retirement $0.00
Removal $450,000.00
Total (excl. Rets.) $1,950,000.00
Credits $0.00
Net $1,950,000.00
Revision Info
Other Updates
Revision 2 of 2
Find Revision
Send for Approval
Show 'Budget Only' Revisions
Spending Estimates:
Grid Estimates
Forecast
Summarize from WO
Copy Estimate
Property Estimates:
Unit Estimates
Create As Built
Delete Used Estimates
Edit:
New Revision
Delete Revision
Update
Update With Actuals
Import Estimates
Other:
Revision Comments
Released Dollars
Substitution
Slide
Version Compare
Close
Record 4 of 32
Audits

5360-Narragansett Electric and Gas
Project Revision Detail Report

Fund Project Number: C048687 **USSC #:** USSC-13-084

Revision: 2 **Budget Version:** Default

Project Title: LIN13 Renovate Lincoln Ops Center

Project Description: Design and renovation of Lincoln Ops Facilities to perform building systems upgrades and to accommodate additional occupants from Cumberland Ops Facility.

Project Status: Closed

Responsible Person: BURNS, PATRICK **Initiator:** Mateikis, Ausra

Spending Rationale: **Funding Type:** P FAC Electric Capital RI

Budget Class:

Capital by Category:

Program Code:

Project Risk Score: **Project Complexity Score:** 12

Project Schedule / Expenditures

Revision Status: Approved

Est Start Date: 10/15/2011 **Est Complete Date:** 12/31/2013

Est In-Service Date: 12/31/2013

TTD Actuals: $1,783,105 **As Of:** 10/3/2017

Cost Breakdown	Capital	Expense	Removal	Total	Credits
	$1,500,000	$0	$450,000	$1,950,000	$0

Justification / Risk Identification:

Looking to vacate Cumberland Ops buildings.

Project Scope:

Design and renovation of Lincoln Ops Facilities to perform building systems upgrades and to accommodate additional occupants from Cumberland Ops Facility.

Project Alternatives Considered:

<Enter data here>

Additional Notes:

Old FP# C042348 needs to be transferred to this new FP#C048687. The old project was set up before SAP and it converted with the wrong WO type. Due to wrong WO type we can not add proper Facilities operations for estimates and provide details for the as builts.
Sanction paper# USSC-13-084.

Related Projects:

Project Number:	Project Name:

Approvals

Line 1:	**Date**	5/22/2013 08:50:01	**Approver**	carlim	USSC Approver
Line 2:	**Date**		**Approver**		
Line 3:	**Date**		**Approver**		
Line 4:	**Date**		**Approver**		
Line 5:	**Date**		**Approver**		

***Project Authorization is for Approved Revision Total Estimated Cost +10% ***

US Sanction Paper

nationalgrid

Title:	Lincoln Consolidation	**Sanction Paper #:**	USSC-13-084
Project #:	C042348 changed to C0486987	**Sanction Type:**	Sanction
Operating Company:	Narragansett Electric Company.	**Date of Request:**	2/27/13
Author:	Patrick Burns		Rudy Wynter
Utility Service:	Property	**Project Manager:**	Tom Wall

1 *Executive Summary*

1.1 Sanctioning Summary:

This paper requests sanction of Project C042348 C0486987 in the amount of $ 1,950,000 with a tolerance of 10% for the purposes of engineering, and construction to consolidate Gas operations from Cumberland operations facility and the meter testing operations from Cumberland and Dexter St facilities into the Lincoln operations facility.

The sanction amount is $ 1,950,000 broken down into:

$1,735,000 Capex
$ 215,000 Removals

1.2 Brief Description:

The Lincoln facility is located within 3.2 miles of Cumberland facility and both facilities are currently underutilized. Consolidating Gas Operations and meter test operations will allow National Grid to lease the Cumberland facility. Work entails renovating office and crew room areas as well as fitting out an area for testing of gas meters in Rhode Island.

1.3 Summary of Projects:

Project Number	Project Title	Estimate Amount
C042348 to C0486987	Lincoln Renovation	$1,950,000
	Total	**$1,950,000**

US Sanction Paper

nationalgrid

1.4 Associated Projects:

Project Number	Project Title	
C044972	Lincoln Paving & Sitework	$625,000
	Cumberland Decommissioning	$150,000
	Total	**$775,000**

1.5 Prior Sanctioning History (including relevant approved Strategies):

Date	Governance Body	Sanctioned Amount	Paper Title	Sanction Type

1.6 Next Planned Sanction Review:

Date (Month/Year)	Purpose of Sanction Review
October 2013	Project Closure

1.7 Category:

Category	Reference to Mandate, Policy, or NPV Assumptions
○ Mandatory ○ Policy- Driven ◉ Justified NPV	The project is NPV positive if the Cumberland facility is leased. The leasing of the facility is directly linked to the security of gas supply study for the state of RI, which is currently underway. Expansion of the Cumberland LNG facility, located on an adjacent parcel of land is being considered. Locating additional LNG facilities at the Cumberland location may preclude leasing of the facility.

US Sanction Paper

nationalgrid

1.8 Asset Management Risk Score

Asset Management Risk Score: n/a

Primary Risk Score Driver: (Policy Driven Projects Only)

○ Reliability ○ Environment ○ Health & Safety ⊙ Not Policy Driven

1.9 Complexity Level: (if applicable)

○ High Complexity ⊙ Medium Complexity ○ Low Complexity ○ N/A

Complexity Score: _12____

1.10 Process Hazard Assessment

A Process Hazard Assessment (PHA) is required for this project:

○ Yes ⊙ No

1.11 Business Plan:

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
Facilities Management Capital; Plan FY13-FY17	⊙ Yes ○ No	○ Over ⊙ Under	$0.0

1.12 If cost > approved Business Plan how will this be funded?

Capital costs are included in Facilities Management capital plan.

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1.13 Current Planning Horizon:

		Current Planning Horizon						
	Prior Yrs	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6+	
		2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	Total
Capex	$0.00	$0.15	$1.58					$1.73
Opex								$0.00
Removal		$0.02	$0.20					$0.22
CIAC/ Reimbursement								$0.00
Total	$0.00	$0.17	$1.78	$0.00	$0.00	$0.00	$0.00	$1.95

1.14 Resources:

Resource Sourcing			
Engineering & Design Resources to be provided	☐ Internal	☑ Contractor	
Construction/Implementation Resources to be provided	☐ Internal	☑ Contractor	
Resource Delivery			
Availability of internal resources to deliver project:	○ Red	◉ Amber	○ Green
Availability of external resources to deliver project:	○ Red	○ Amber	◉ Green
Operational Impact			
Outage impact on network system:	○ Red	○ Amber	◉ Green
Procurement impact on network system:	○ Red	○ Amber	◉ Green

1.15 Key Issues (include mitigation of Red or Amber Resources):

1	If necessary a 3rd party PM resource will be utilized to manage this project
2	
3	

US Sanction Paper

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1.16 Key Milestones:

Milestone	**Target Date: (Month/Year)**
Engineering and Design	12/2012
Bid Construction	2/2013
Sanction	2/2013
Begin Construction	3/2013
Complete Construction	7/2013
Project Closeout	10/2013

1.17 Climate Change:

Are financial incentives (e.g. carbon credits) available?		O Yes	⊙ No
Contribution to National Grid's 2050 80% emissions reduction target:	O Neutral	⊙ Positive	O Negative
Impact on adaptability of network for future climate change:	⊙ Neutral	O Positive	O Negative

1.18 List References:

1	
2	

US Sanction Paper

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Decisions

The US Sanctioning Committee (USSC) at a meeting held on 2/27/2013:

(a) APPROVED this paper and the investment of $1.95M and a tolerance of +/- 10 % for the total project costs.

(b) NOTED that Tom Wall is the Project Manager and has the approved financial delegation to undertake the activities stated in (a).

Signature.....Date....4/8/13

Lee S. Eckert
US Chief Financial Officer
Chairman, US Sanctioning Committee

US Sanction Paper

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2 *Sanction Paper Detail*

Title:	Lincoln Consolidation	**Sanction Paper #:**	USSC-13-084
Project #:	C042348 changed to C0486987	**Sanction Type:**	Sanction
Operating Company:		**Date of Request:**	2/27/13
Author:	Patrick Burns	**Sponsor:**	Rudy Wynter
Utility Service:	Property	**Project Manager:**	Tom Wall

2.1 Background

The Lincoln Service Center was constructed in the 1960s and currently houses electric overhead operations, backup electric distribution and transmission control centers and its supporting data center, as well as a vehicle repair facility. The Cumberland RI facility currently houses gas construct and maintain, meter test and vehicle repair. There is surplus space in both facilities as a result of several department consolidations and relocations that have occurred over the last several years.

2.2 Drivers

Both the Lincoln and Cumberland facilities have been evaluated to determine the most cost effective consolidation opportunity. The relocation of the back up control centers from Lincolnto other company locations was evaluated and proved to be too costly based upon the IS infrastructure that supports the control centers. The proximity of the Cumberland facility allows for a consolidation with no impact on customer response times for Gas operations.

By consolidating into the Lincoln facility, the operation and maintenance cost of the Cumberland facility will be substantially reduced. The building will be available for leasing, contingent upon the results of an ongoing gas supply study of potential LNG facilities in Rhode Island. Once the gas supply study is completed, the disposition of the Cumberland facility will be determined.

2.3 Project Description

The project entails renovation to a portion of the Lincoln facility to allow consolidation of Gas operations personnel from the Cumberland facility and meter test personnel from the Cumberland and Dexter St facilities. Renovations for Gas operations include office area and crew support areas. The existing stockroom has adequate capacity for the materials required for Gas operations. The meter and test area will require additional utilities to support the testing operation. The area has been laid out for a safe and

efficient flow of meters through the proving and testing process. A ladies locker room will be constructed adjacent to the meter test area. An existing unoccupied open area within the facility will be renovated to support a large training / meeting room, to allow for onsite meetings of up to 100 personnel. Additional building code required upgrades include, but are not limited to, fire alarm modifications, ADA required renovations to a rest room, new backflow preventer for the water intake to the facility.

2.3 Benefits Summary

Consolidating the remaining departments from Cumberland to Lincoln will better utilize the Lincoln facility and allow the potentially leasing of the Cumberland facility. The meter test operations will be consolidated into one location in Rhode Island. The new meter and test area in Lincoln will allow for a more efficient operation.

2.4 Business Issues

The projected overall project costs are included in Facilities Management's FY14 capital budget. This project is supported by the RI jurisdiction.

2.5 Alternatives

Alternative 1: Do Nothing. This option will leave 2 underutilized facilities within 3 miles of each other, continuing to incur operation and maintenance costs for both locations.

Alternative 2: Perform the work in a phased approach over a number of years. This method will increase the cost of the total project because of multiple mobilizations for the contractor, multiple procurement transactions and increased project management costs.

Alternative 3: Defer this project until next fiscal year.

2.6 Safety, Environmental and Project Planning Issues

Safety

Personnel shall ensure they are following the latest procedures for the work they are undertaking. This will be accomplished by putting together a health and safety plan and by ensuring oversight with adequate supervision. Proper clothing and PPE shall be worn by all working on the project.

Environment

Construction will adhere to appropriate existing environmental policies and procedures.

No public outreach will be necessary as construction will occur in a facility currently owned and operated by National Grid.

2.7 Execution Risk Appraisal

Number	Detailed Description of Risk / Opportunity	Probability	Impact		Score		Strategy	Pre-Trigger Mitigation Plan	Residual Risk	Post Trigger Mitigation Plan
			Cost	Schedule	Cost	Schedule				
1	Unforseen Conditions During Construction	3	3	3	9	9	Mitigate	Work closley w/ A& E and contractor to identify potential areas of concern and develop solutions.	Change in scope effects costs and schedule	Continue to monitor contractor performance.
2	Delay in procurement of procuring contracotr	3	3	3	9	9	Mitigate	Work closely with Procurement to prioritize Facilities Management work	Project is delayed	Meet weekly with Director in Procurment to keep project on track
3	Environmnetal Contamination encountered during construction	3	4	3	12	9	Mitigate	Work closely with Environmnetal to test ahead of construction	Project is delayed	Meet weekly with Environmental to keep project on track

2.8 Permitting

Permit Name	Probability Required (Certain/ Likely/ Unlikely)	Duration	Status (Complete/ In Progress Not Applied For)	Estimated Completion Date
Building permit	Certain	30 days	Not applied For	3/15/2013

2.9 Investment Recovery

2.9.1 Investment Recovery and Regulatory Implications

Investment recovery will be through standard rate recovery mechanisms approved by appropriate regulatory agencies.

2.9.2 Customer Impact

This project results in a better utilized facility.

2.9.3 CIAC / Reimbursement

None

2.10 Financial Impact to National Grid

2.10.1 Cost Summary Table

					Current Planning Horizon						
Project Title	Project Number	Project Estimate	Spend	Prior Yrs	Yr 1 2012/13	Yr 2 2013/14	Yr 3 2014/15	Yr 4 2015/16	Yr 5 2016/17	Yr 6+ 2017/18	Total
Lincoln Consolidation	C04238	+/- 10%	Capex	0	$0.15	$1.58					$1.73
			Opex		$0.00						$0.00
			Removal		$0.02	$0.20					$0.22
			Total	$0.00	$0.17	$1.78	$0.00	$0.00	$0.00	$0.00	$1.95

It is expected that the plant will be capitalized when the project is placed in service

US Sanction Paper

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2.10.2 Project Budget Summary Table

Project Costs Per Business Plan

		Current Planning Horizon						
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6+	
Spend	Prior Yrs	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	Total
Capex		$0.15	$1.58					$1.73
Opex		$0.00						$0.00
Removal		$0.02	$0.20					$0.22
Total Cost in Bus. Plan	$0.00	$0.17	$1.78	$0.00	$0.00	$0.00	$0.00	$1.95

Variance

		Current Planning Horizon						
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6+	
Spend	Prior Yrs	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	Total
Capex		$0.00	$0.00					$0.00
Opex								$0.00
Removal		$0.00	$0.00	0				$0.00
Total Cost in Bus. Plan	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00

2.10.3 Cost Assumptions

Costs are based upon competitive bids for the construction of the project.

2.11 Statements of Support

2.11.1 Supporters

Role	Name	Responsibilities
Jurisdictional President	Tim Horan	RI Jurisdiction
Ops Support VP	Neil Proudman	Operations Support
Gas Operations VP	John Flint	NE Gas Operation

2.11.2 Reviewers

Reads paper for content / language. Recommends edits if necessary

Reviewer List	Name
Finance	Paul Flaherty
Regulatory	Gideon Katsh
Jurisdictional Delegates	

3 Appendices

3.1 Project Cost Breakdown

Cost Category	
Engineering and Project Management	$0.280 M
Demolition/ Removal	$0.215 M
Renovation Costs	$ 1.465 M
Total	**$ 1.950 M**

Flynn, Janice

From: Mateikis, Ausra
Sent: Tuesday, May 21, 2013 3:56 PM
To: Flynn, Janice
Subject: RE: Funding Project Approval

Hi Janice,

I am not sure when exactly. Some shopping carts and PO are still tied to the old WO. I will check with project manager how much longer he expects this project to be active.

Ausra Mateikis
Associate Analyst / Facilities Services
Property Services
nationalgrid
40 Sylvan Road
Waltham, MA 02451
Phone: 781-907-2295 Fax: 781-522-1052
E-mail: Ausra.Mateikis@nationalgrid.com

To reach Property Services help-line call 877-636-0411 and follow the prompts or submit a self-help ticket by clicking on the below link
http://nyhcbapp79/FacilityPortal/index.html
P Help to save paper - do you need to print this email?

-----Original Message-----
From: Flynn, Janice
Sent: Tuesday, May 21, 2013 3:46 PM
To: Mateikis, Ausra
Cc: Carlino, Mario
Subject: RE: Funding Project Approval

Hi Ausra

When will the charges move to the new project and the old project cancelled?

I will need to update the sanction paper to reflect the new project number. You can resubmit it for approval.

Mario..Ausra will resubmit for approval please wait for me to update the paper and attach it before approving..I will let you know when I have completed the update.

Thanks
Janice

-----Original Message-----
From: Mateikis, Ausra
Sent: Tuesday, May 21, 2013 3:30 PM
To: Flynn, Janice
Cc: Carlino, Mario
Subject: RE: Funding Project Approval

I had to create a new project (C048687) and transfer the old project (C042348) charges. I put this explanation in justification notes as well. The reason I had to do that because it converted wrong in the new PowerPlant. C042348 project was created in the old system and it converted with the wrong WO type (electric generation not facilities). WO type directly ties to Operation mapping - with the wrong WO type I can not use any of Facilities capital operations except for default ones (9xxx). So the charging would not be accurate as well as As built and retirement units.

When the charges are transferred to the new project, I will close the old project. The old project doesn't have all the new updates.

Ausra Mateikis
Associate Analyst / Facilities Services
Property Services
nationalgrid
40 Sylvan Road
Waltham, MA 02451
Phone: 781-907-2295 Fax: 781-522-1052
E-mail: Ausra.Mateikis@nationalgrid.com

To reach Property Services help-line call 877-636-0411 and follow the prompts or submit a self-help ticket by clicking on the below link
http://nyhcbapp79/FacilityPortal/index.html
P Help to save paper - do you need to print this email?

-----Original Message-----
From: Flynn, Janice
Sent: Tuesday, May 21, 2013 3:09 PM
To: Mateikis, Ausra
Cc: Carlino, Mario
Subject: RE: Funding Project Approval

Hi Ausra
Project C048687 is not the project listed on the Sanction Paper USSC-13-084 Project C042348 is on the Sanction Paper. It there a reason for the 2 projects for the Lincoln Renovation Project?
Thanks
Janice

-----Original Message-----
From: Mateikis, Ausra
Sent: Tuesday, May 21, 2013 2:15 PM
To: Flynn, Janice
Cc: Carlino, Mario
Subject: RE: Funding Project Approval

Hi,

I got the Sanction paper# for Lincoln renovation project. I added the # to the Justification notes. Can I re-send the project for approval?

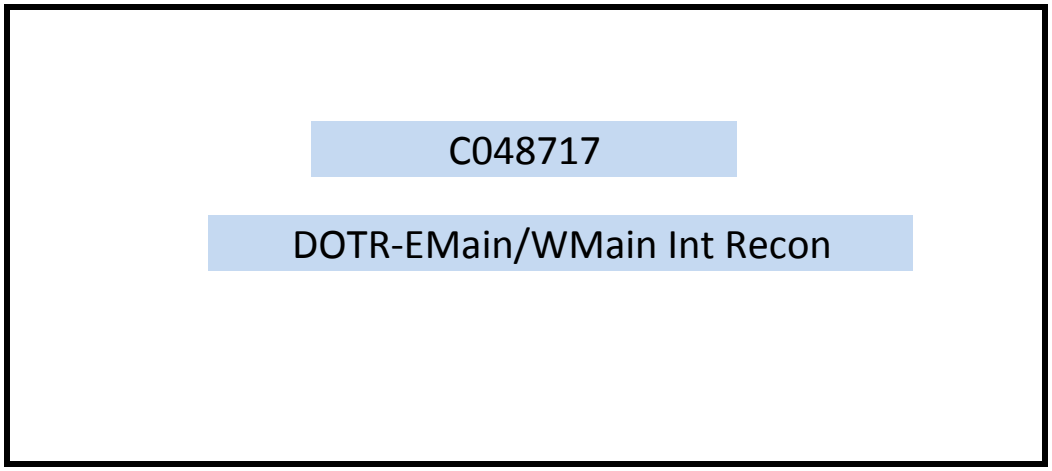
#USSC-13-084

Thank you.

Ausra Mateikis
Associate Analyst / Facilities Services
Property Services
nationalgrid
40 Sylvan Road
Waltham, MA 02451
Phone: 781-907-2295 Fax: 781-522-1052
E-mail: Ausra.Mateikis@nationalgrid.com

To reach Property Services help-line call 877-636-0411 and follow the prompts or submit a self-help ticket by clicking on the below link
http://nyhcbapp79/FacilityPortal/index.html
P Help to save paper - do you need to print this email?

-----Original Message-----


C048717
DOTR-EMain/WMain Int Recon

5360-Narragansett Electric and Gas
Project Revision Detail Report

Fund Project Number:	C048717	**USSC #:**	
Revision:	2	**Budget Version:**	Default
Project Title:	DOTR-EMain/WMain Int Recon		
Project Description:	The Rhode Island Department of Transportation (RIDOT) has proposed reconstruction of East Main Road / West Main Road intersection (aka Two Mile Corner) in Middletown, RI. This proposed roadwork requires the relocation of approx 18 JO Poles (NGrid set) and associated anchors and OH conductors. This project is 100% reimbursable		

Project Status:	open		
Responsible Person:	CAPOBIANCO, THOM	**Initiator:**	Capobianco III, Thoma
Spending Rationale:	Customer Request/Public Require	**Funding Type:**	P Electric Distribution Line RI
Budget Class:	Public Requirements		
Capital by Category:			
Program Code:			
Project Risk Score:	49	**Project Complexity Score:**	11

Project Schedule / Expenditures

Revision Status:	Approved		
Est Start Date:	3/25/2013	**Est Complete Date:**	12/31/2016
Est In-Service Date:	12/31/2016		
TTD Actuals:	$359,804	**As Of:**	10/3/2017

Cost Breakdown	Capital	Expense	Removal	Total	Credits
	$454,400	$85,200	$170,400	$710,000	$0

Justification / Risk Identification:

<Enter data here>

Project Scope:

1. This project requires National Grid to relocate of approx 29 JO Poles (NGrid set), associated anchors, and OH conductors and equipment along East Main and West Main Roads in Middletown, RI. 2. At least two meetings may be requested by Verizon to be followed by another 4 meeting with RI DOT and/or its consultant. 3. Designer to attend any town meeting that is required for the approval of the permit (assume at least 4 meetings may be needed). 4. This project is considered reimbursable under the US Department of Transportation Federal Highway Administration Policy and Procedure Memorandum 20-4-5. No Betterment work is planned for this project. 6. Poles to be a minimum of

Project Alternatives Considered:

<Enter data here>

Additional Notes:

Sanction from $40K to $710K document attached. This project was approved for 40K in March, 2013 for Pre-Engineering costs. Based on the final design it was determined that the job would cost 710K for the total project including construction. The following is a break down of costs for the project, 515K for Labor and Labor Overheads including Engineering & Design, 100K for Materials and Material Overheads, 40K for Transportation, 45K for Police Protection and 10K for Civil bringing the total project cost to 710K.

Related Projects:

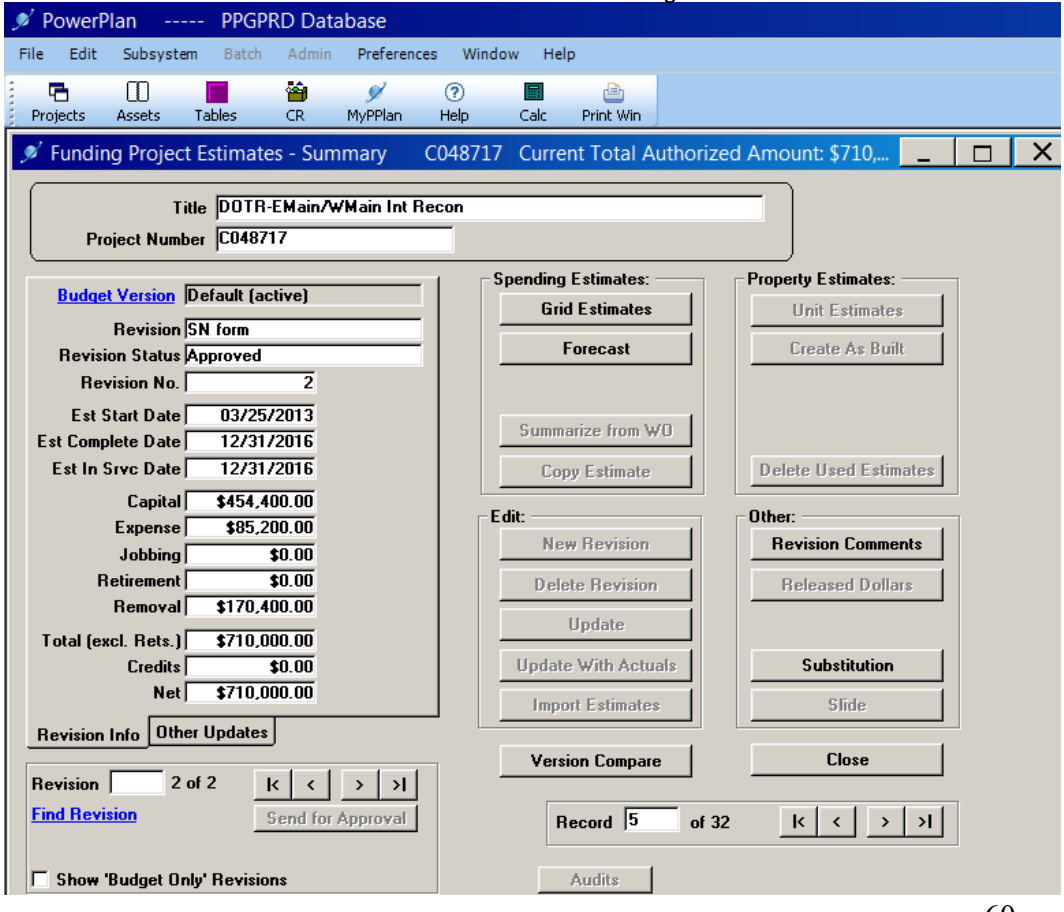
Project Number:	Project Name:

Approvals

Line 1:	**Date**	8/18/2016 14:22:01	**Approver**	curljo	DOA - Distribution Lev
Line 2:	**Date**	8/22/2016 08:39:41	**Approver**	Diconza, Glen L	DOA - Distribution Lev
Line 3:	**Date**	8/26/2016 08:51:01	**Approver**	Gelineau, Gary J	DOA - Distribution Lev
Line 4:	**Date**	8/30/2016 11:25:26	**Approver**	Cox, Roger D	DOA - Distribution Lev
Line 5:	**Date**	9/2/2016 10:37:58	**Approver**	LaBarre, Alan T	DOA - Distribution Lev

*****Project Authorization is for Approved Revision Total Estimated Cost +10%*****

REDACTED - CEII Information has been Redacted



Change in DOA Request Form (Less than Million)

Version 9.4

Note: Fill data in the grey area and email form to **Mario Carlino** and the appropriate IP analyst.
Electric - Janice Flynn
Gas - Karen Jasinowski

*Date:	8/9/2016
*Operating Company:	The Narragansett Electric Co.
*PowerPlant Project #:	C048717
*Project Name:	DOTR-EMain/WMain Int Recon
*Project Engineer:	Dave Evans
*Project/Program Manager:	Thomas Capobianco
*DoA Type:	Re-Sanction

Latest Project Estimate

*Date of Latest Sanction:	3/26/2013

Total	Capex	Opex	Removal
$40,000	$40,000	$0	$0

Revised Project Estimate

Total	Capex	Opex	Removal
$710,000	$454,400	$85,200	$170,400

Cash Flows

Previous FY	Capex	Opex	Removal
$0			

Current FY	Capex	Opex	Removal
$710,000	$454,400	$85,200	$170,400

FY+1	Capex	Opex	Removal
$0			

FY+2	Capex	Opex	Removal
$0			

Customer Contribution

Reason for Revision

☑	Revised forecast either exceeds or is lower than the Approved Amount - Project Still In Process
	New Project Estimated Completion Date: 12/30/2016

☐	Actual Spending either exceeds or is lower than the Approved Amount – Project is Complete

The below information is required and must be filled in

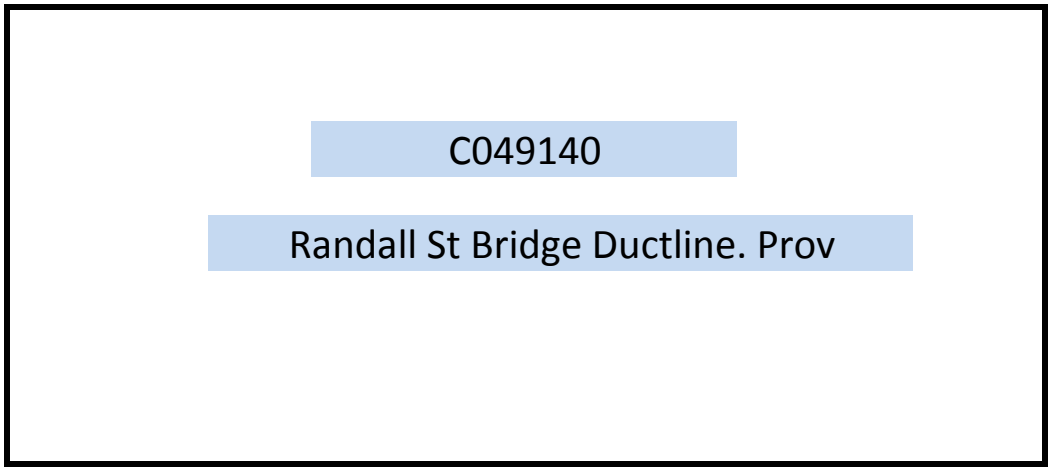
	Reason for Change in Spend
	This project was approved for 40K in March, 2013 for Pre-Engineering costs. Based on the final design it was determined that the job would cost 710K for the total project including construction. The following is a break down of costs for the project, 515K for Labor and Labor Overheads including Engineering & Design, 100K for Materials and Material Overheads, 40K for Transportation, 45K for Police Protection and 10K for Civil bringing the total project cost to 710K.
	Justification / Risk Identification

Change in DOA Request Form (Less than Million)

	New/Changed Project Scope (Material, Labor or Other)
	1. This project requires National Grid to relocate of approx 29 JO Poles (NGrid set), associated anchors, and OH conductors and equipment along East Main and West Main Roads in Middletown, RI. 2. At least two meetings may be requested by Verizon to be followed by another 4 meeting with RI DOT and/or its consultant. 3. Designer to attend any town meeting that is required for the approval of the permit (assume at least 4 meetings may be needed). 4. This project is considered reimbursable under the US Department of Transportation Federal Highway Administration Policy and Procedure Memorandum 30-4. 5. No Betterment work is planned for this project. 6. Poles to be a minimum of 45' class 2. 7. This project is conceptually estimated to cost $100,000 for construction. Based on this scope if the Consultant determines that estimate is not reflective of field assessment or conditions (higher or lower) the Liaison Engineer should be notified. Additionally, the Consultant should provide potential reasons for difference between conceptual estimates versus field conditions. 8. As detailed in the "Requirements Due Dates & Requirement Schedule" section of this scope memo the 270 requirement is required to be in status "complete" on 06/01/13. The following items, but not limited to, are required to also be complete and submitted as part of the 270 requirement: Dig-Safe forms, Notice of Excavation, outage information, non-standard sketches, one-line diagrams, petition / permit drawings, all required permit applications, environmental checklist, easement drawings, 605 / EON notices, etc. 9. Prior to detailed GIS design a constructability review (237 requirement) should be conducted between the Consultant, Liaison Engineer, Operations Representative, and any other significant construction related stakeholder depending on complexity of work. It is important that ideas and concepts voiced by Operations be taken into the final design of the job.
	Project Alternatives Considered
	Additional Notes

In-service Dates

*Original In-service Date:	12/31/2016
*Revised In-service Date:	12/30/2016


C049140
Randall St Bridge Ductline. Prov

5360-Narragansett Electric and Gas
Project Revision Detail Report

Fund Project Number: C049140 **USSC #:**

Revision: 2 **Budget Version:** Default

Project Title: Randall St Bridge Ductline. Prov

Project Description: Install new duct crossing in Randall Street Bridge in Providence to replace existing severely deteriorated ductline. Work requires temporary relocation of two circuits and must be coordinated with RIDOT's bridge reconstruction, which is presently underway.

Project Status: Closed

Responsible Person: MOKEY, MICHAEL **Initiator:** Livingston, Claire L

Spending Rationale: Asset Condition **Funding Type:** P Electric Distribution Line RI

Budget Class: Asset Replacement

Capital by Category:

Program Code:

Project Risk Score: 46 **Project Complexity Score:** 14

Project Schedule / Expenditures

Revision Status: Approved

Est Start Date: 4/18/2013 **Est Complete Date:** 6/11/2014

Est In-Service Date: 6/11/2014

TTD Actuals: $413,143 **As Of:** 10/3/2017

Cost Breakdown	Capital	Expense	Removal	Total	Credits
	$232,200	$103,200	$94,600	$430,000	$0

Justification / Risk Identification:

RIDOT presently has under construction a project to replace the Randall Street bridge over the Moshassuck River in Providence. The bridge is being completely demolished and replaced, including concrete deck, girders, and support members. National Grid has two separate ductlines on the bridge, which are being temporarily supported during the bridge work. One of the two ductlines was installed in approximately 1916 when the bridge was first built, and upon removal of the bridge deck, was found to be so severely deteriorated that cables inside the ducts are visible through holes in the ducts. The system cannot be eliminated without replacement, and in-place repair is not feasible.

Project Scope:

Install 150' of ductline, 1680 ckt ft of 500 kcmil compact Cu EPR 5 kV cable, 620 ckt ft of 500 kcmil compact Cu EPR 15 kV cable, 1560 ckt ft of 4/0 Cu EPR 15 kV cable, and miscellaneous underground equipment.

Remove 1120 ckt ft of various 5 kV PILC cable, 950 ft of 3/C-450 kcmil Cu PILC 11 kV cable, 860 ckt ft of 4/0 Cu PILC 15 kV cable, 440 ft of 500 kcmil compact Cu 5 kV cable, 880 ft of 4/0 Cu EPR 15 kV cable, and miscellaneous underground equipment.

Project Alternatives Considered:

The alternative to leaving 9J3 and 1110/1110A in the 9-way duct system is not recommended because it would leave no spare ducts in the manhole/duct system used for 23 kV supply to Lippitt Hill substation and 12 kV Capital Center feeders.

Additional Notes:

Re-Sanction from $375 to $430K from Julie Spaziano. Civil contractor charges were not included on the original estimate for 55k brining the total project cost to 430k.

Related Projects:

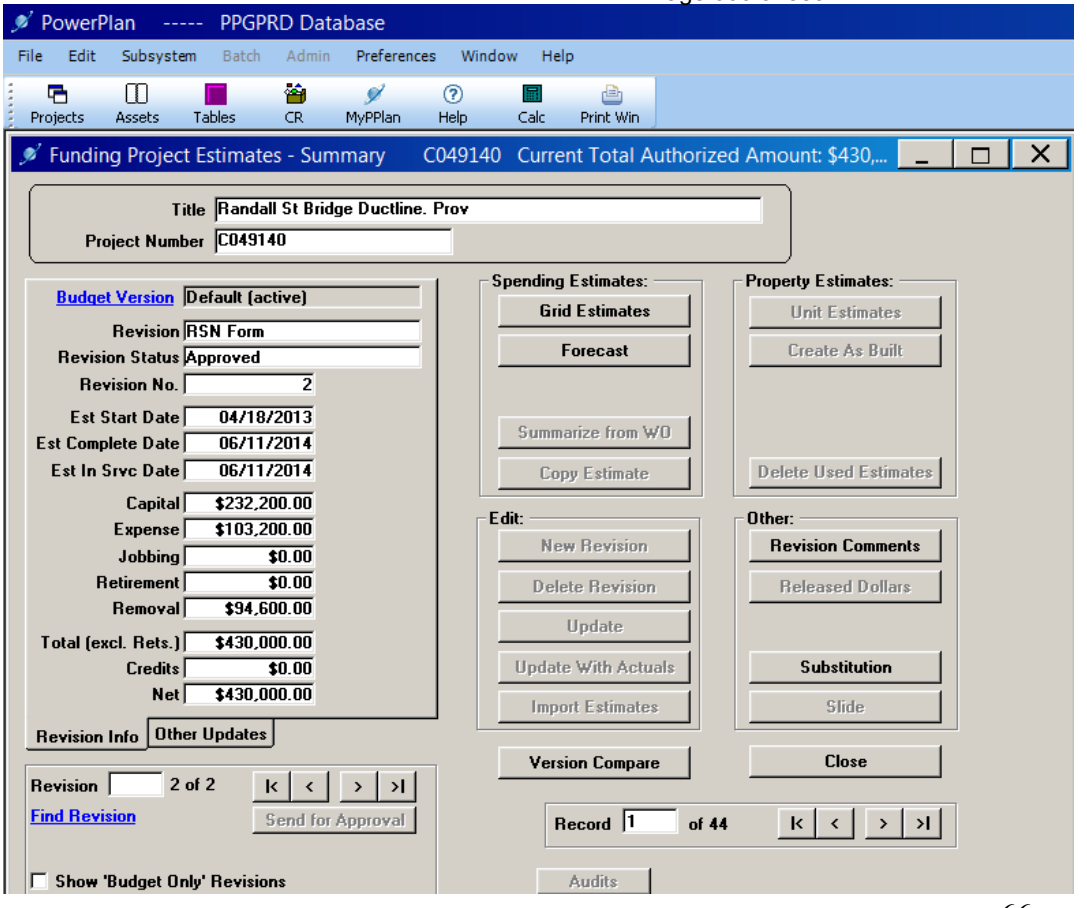
Project Number:	Project Name:

Approvals

Line 1:	**Date**	8/21/2014 14:58:19	**Approver**	mokeym	DOA - Distribution Lev
Line 2:	**Date**	8/22/2014 09:43:36	**Approver**	Diconza, Glen L	DOA - Distribution Lev
Line 3:	**Date**	8/27/2014 17:19:43	**Approver**	Constable, Ryan	DOA - Distribution Lev
Line 4:	**Date**	8/28/2014 08:54:54	**Approver**	Pendrake, Robert C	DOA - Distribution Lev
Line 5:	**Date**	9/5/2014 12:16:22	**Approver**	LaBarre, Alan T	DOA - Distribution Lev

*****Project Authorization is for Approved Revision Total Estimated Cost +10%*****

REDACTED - CEII Information has been Redacted



Change in DOA Request Form (Less than Million)

Version 9.0

Note: Fill data in the grey area and email form to **Mario Carlino** and the appropriate IP analyst.
Gas - Tracy Nguyen
Electric - Janice Flynn

*Date:	8/18/2014
*Operating Company:	The Narragansett Electric Co.
*PowerPlant Project Id:	C049140
*Project Name:	Randall St Bridge Ductline. Prov.
*Project Engineer:	John Castro
*Project Manager:	Mike Mokey

Latest Project Estimate

*Date of Latest Sanction:	4/18/2013

Total	Capex	Opex	Removal
$375,000	$202,500	$90,000	$82,500

Revised Project Estimate

Total	Capex	Opex	Removal
$430,000	$232,200	$103,200	$94,600

Cash Flows

Previous FY	Capex	Opex	Removal
$300,000	$162,000	$72,000	$66,000

Current FY	Capex	Opex	Removal
$130,000	$70,200	$31,200	$28,600

FY+1	Capex	Opex	Removal
$0			

FY+2	Capex	Opex	Removal
$0			

Customer Contribution

Reason for Revision

☐	Revised forecast either exceeds or is lower than the Approved Amount - Project Still In Process
	New Project Estimated Completion Date:
☑	Actual Spending either exceeds or is lower than the Approved Amount – Project is Complete

Reason for Increased Spending (Please expand the row height if box doesn't fit)

☐	**Change in Scope (Material, Labor or Other)**

Change in DOA Request Form (Less than Million)

☐	**Resource Allocation (Schedule, Delay, OT, or Contractor)**
☑	**Low / High Estimate**
	Civil contractor charges were not included on the original estimate for 55k brining the total project cost to 430k.
☐	**External Forces (Permitting Requirements, Weather, Contractor Issues, etc)**

In-service Dates

*Original In-service Date:	12/31/2013
*Revised In-service Date:	6/11/2014

C049681

Clarkson - EMS Expansion

5360-Narragansett Electric and Gas
Project Revision Detail Report

Fund Project Number: C049681 **USSC #:**

Revision: 7 **Budget Version:** Default

Project Title: Clarkson - EMS Expansion

Project Description: As part of the RTU program to install/expand RTU at the Clarkson Street #13 substation to gain status and control of existing assets at the substation.

Project Status: Closed

Responsible Person: ALEXANDER, THOM/ **Initiator:** Duarte, Eileen M

Spending Rationale: System Capacity & Performance **Funding Type:** P Electric Distribution Sub RI

Budget Class: Reliability

Capital by Category:

Program Code:

Project Risk Score: 34 **Project Complexity Score:** 12

Project Schedule / Expenditures

Revision Status: Approved

Est Start Date: 5/26/2013 **Est Complete Date:** 1/26/2017

Est In-Service Date: 1/26/2017

TTD Actuals: $873,452 **As Of:** 10/3/2017

Cost Breakdown	Capital	Expense	Removal	Total	Credits
	$891,897	$4,718	$2,275	$898,890	$0

Justification / Risk Identification:

A Remote Terminal Unit (RTU) is a device used to transfer operational information from a substation to an Energy Management System (EMS) in a control center. This allows for remote operation and management of the system.

Currently, 71% of the substations in Rhode Island have RTUs installed. The total number of locations that may require an RTU is 33, and the number of locations that may require expansion of the existing RTU is 82. The long term goal of the strategy is to provide remote monitoring and control at all National Grid Substations.

Project Scope:

Provide EMS expansion at the Clarkson Street #13 Substation to include associated wiring to provide status, control and monitoring of the seventeen (17) circuit breakers and reclosers, and two (2) transformers at the Clarkson Street #13 substation to bring back to our Energy Management System. Alarms should include transformer trouble, relay trouble, breaker trouble and transformer low oil. The monitoring should include voltage and current A, B, C, neutral, MW, MVA, MVAR. Control will include trip/close on switching devices, reclose on/off on circuit breakers, control of the LTC or Voltage Regulators.

Project Alternatives Considered:

Outage restrictions due to weather and other ongoing projects in RI. Outage delays due to dispatch difficulty switching out the F1 feeder.

Additional Notes:

Re-Sanction from $745,692 to $898,809 document attached. Revised estimate is higher than original DOA by approximately $153k. Revised estimate is based on actuals to-date now that the project is in-service plus forecasted spend till closeout. During the constructability review meeting for the EMS expansion project, it was discovered that a previous RTU replacement project from 2004 was never completed in construction. The decision was made
Re-Sanction from $263,111 to $745,692 document attached. Revised estimate is higher than original DOA by approximately $482k. Revised estimate is a "project grade estimate" that is based on a more stringent review of

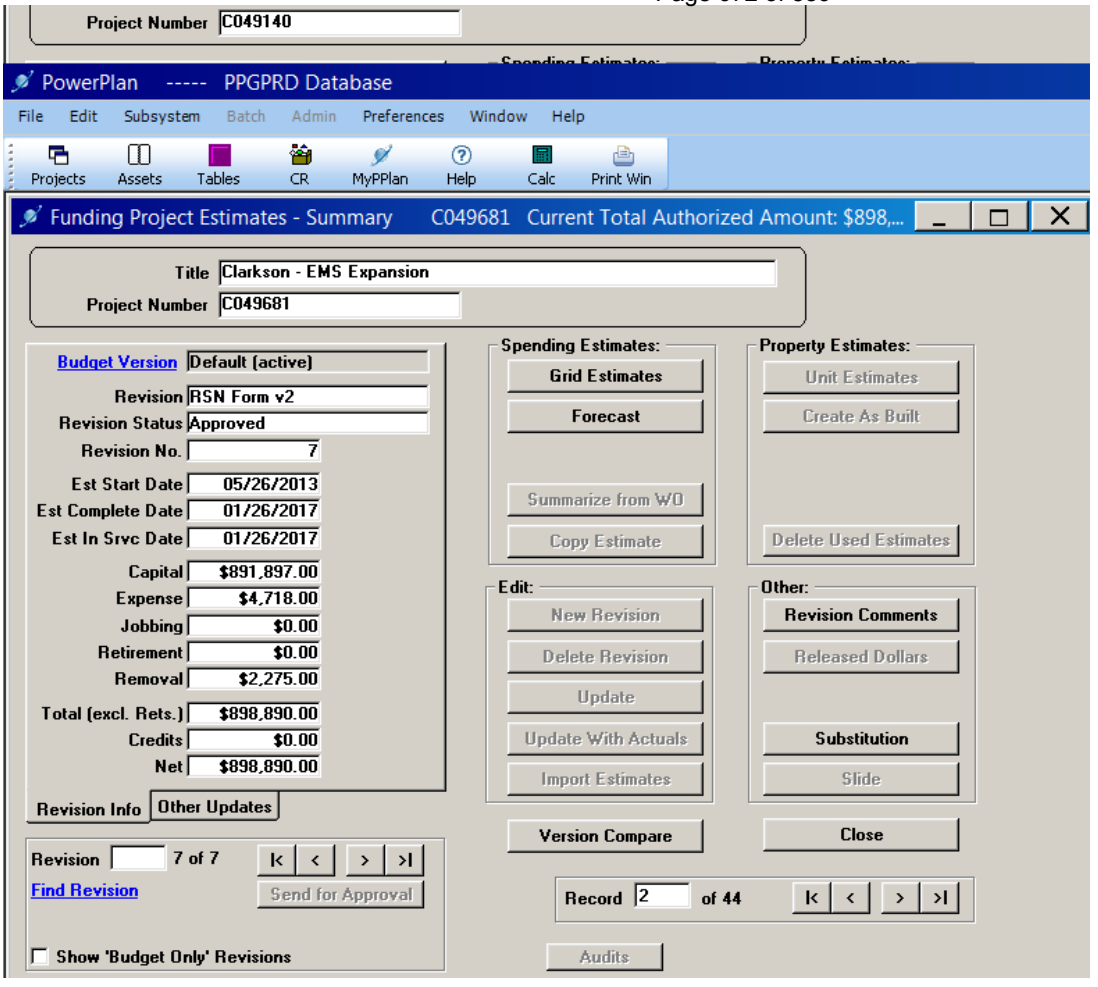
Related Projects:

Project Number:	Project Name:

Approvals

Line 1:	**Date**	10/19/2016 08:31:40	**Approver**	padila	DOA - Distribution Lev
Line 2:	**Date**	10/24/2016 13:48:03	**Approver**	Diconza, Glen L	DOA - Distribution Lev
Line 3:	**Date**	10/27/2016 14:20:26	**Approver**	Gelineau, Gary J	DOA - Distribution Lev
Line 4:	**Date**	10/31/2016 13:21:37	**Approver**	Constable, Ryan	DOA - Distribution Lev
Line 5:	**Date**	11/2/2016 08:03:50	**Approver**	LaBarre, Alan T	DOA - Distribution Lev

*****Project Authorization is for Approved Revision Total Estimated Cost +10%*****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Title Clarkson - EMS Expansion
Project Number C049681
Budget Version Default (active)
Revision RSN Form v2
Revision Status Approved
Revision No. 7
Est Start Date 05/26/2013
Est Complete Date 01/26/2017
Est In Srvc Date 01/26/2017
Capital $891,897.00
Expense $4,718.00
Jobbing $0.00
Retirement $0.00
Removal $2,275.00
Total (excl. Rets.) $898,890.00
Credits $0.00
Net $898,890.00
Revision Info
Other Updates
Revision 7 of 7
Find Revision
Send for Approval
Show 'Budget Only' Revisions
Spending Estimates:
Grid Estimates
Forecast
Summarize from WO
Copy Estimate
Property Estimates:
Unit Estimates
Create As Built
Delete Used Estimates
Edit:
New Revision
Delete Revision
Update
Update With Actuals
Import Estimates
Other:
Revision Comments
Released Dollars
Substitution
Slide
Version Compare
Close
Record 2 of 44
Audits

Change in DOA Request Form (Less than Million)

Version 9.0

Note: Fill data in the grey area and email form to **Mario Carlino** and the appropriate IP analyst.
Gas - Tracy Nguyen
Electric - Janice Flynn

*Date:	10/17/2016
*Operating Company:	The Narragansett Electric Co.
*PowerPlant Project Id:	C049681
*Project Name:	Clarkson St - EMS Expansion
*Project Engineer:	Mary Foster
*Project Manager:	Tom Alexander

Latest Project Estimate

*Date of Latest Sanction:	3/14/2016

Total	Capex	Opex	Removal
$745,692	$724,017	$2,400	$19,275

Revised Project Estimate

Total	Capex	Opex	Removal
$898,890	$891,897	$4,718	$2,275

Cash Flows

Previous FY	Capex	Opex	Removal
$587,662	$582,944	$4,718	

Current FY	Capex	Opex	Removal
$311,228	$308,953	$0	$2,275

FY+1	Capex	Opex	Removal
$0			

FY+2	Capex	Opex	Removal
$0			

Customer Contribution

Reason for Revision

☑	Revised forecast either exceeds or is lower than the Approved Amount - Project Still In Process
	New Project Estimated Completion Date: 1/26/2017
☐	Actual Spending either exceeds or is lower than the Approved Amount – Project is Complete

Reason for Increased Spending (Please expand the row height if box doesn't fit)

☐	**Change in Scope (Material, Labor or Other)**

Change in DOA Request Form (Less than Million)

☐	**Resource Allocation (Schedule, Delay, OT, or Contractor)**
☑	**Low / High Estimate**
	Revised estimate is higher than original DOA by approximately $153k. Revised estimate is based on actuals to-date now that the project is in-service plus forecasted spend till closeout. During the constructability review meeting for the EMS expansion project, it was discovered that a previous RTU replacement project from 2004 was never completed in construction. The decision was made that this old RTU project needed to be completed (as Phase 1) to accomplish the intent of the EMS expansion project. $260k from the previous revision accounted for the construction and engineering costs for phase 1, which wound up being approx $108k low for the labor hours and add'l materials required to reconcile the old RTU work.
☑	**External Forces (Permitting Requirements, Weather, Contractor Issues, etc)**
	Outage restrictions due to weather and other ongoing projects in RI. Outage delays due to dispatch difficulty switching out the F1 feeder.

In-service Dates

*Original In-service Date:	7/1/2016
*Revised In-service Date:	9/29/2016

C049682

Warwick 52 - EMS Expansion

5360-Narragansett Electric and Gas
Project Revision Detail Report

Fund Project Number: C049682 **USSC #:**

Revision: 5 **Budget Version:** Default

Project Title: Warwick 52 - EMS Expansion

Project Description: As part of the RTU program to install/expand RTU at Warwick #52 substation to gain status and control of existing assets at the substation.

Project Status: open

Responsible Person: ALEXANDER, THOM/ **Initiator:** Duarte, Eileen M

Spending Rationale: System Capacity & Performance **Funding Type:** P Electric Distribution Sub RI

Budget Class: Reliability

Capital by Category:

Program Code:

Project Risk Score: 34 **Project Complexity Score:** 12

Project Schedule / Expenditures

Revision Status: Approved

Est Start Date: 5/26/2013 **Est Complete Date:** 12/30/2015

Est In-Service Date: 12/30/2015

TTD Actuals: $491,947 **As Of:** 10/3/2017

Cost Breakdown	Capital	Expense	Removal	Total	Credits
	$438,531	$0	$7,446	$445,977	$0

Justification / Risk Identification:

A Remote Terminal Unit (RTU) is a device used to transfer operational information from a substation to an Energy Management System (EMS) in a control center. This allows for remote operation and management of the system.

Currently, 71% of the substations in Rhode Island have RTU¿s installed. The total number of locations that may require an RTU is 33, and the number of locations that may require expansion of the existing RTU is 82. The long term goal of the strategy is to provide remote monitoring and control at all National Grid Substations.

Project Scope:

Provide EMS expansion at the Warwick #52 Substation to include associated wiring to provide status, control and monitoring of the three (3) circuit breakers and reclosers, and two (2) transformers at the Warwick #52 substation to bring back to our Energy Management System. Alarms should include transformer trouble, relay trouble, breaker trouble and transformer low oil. The monitoring should include voltage and current A, B, C, neutral, MW, MVA, MVAR. Control will include trip/close on switching devices, reclose on/off on circuit breakers, control of the LTC or Voltage Regulators.

Project Alternatives Considered:

<Enter data here>

Additional Notes:

Sanction amount from $20k to $445,977 submitted by Alexander Thomas. Document attached, details on the justification and scope tab. The original sanction provided funding through preliminary engineering only. The re-sanctioning of this project is based on the "planning grade estimate" developed by ECOE and accounts for all phases of this project.

This is part of the EMS Expansion/RTU Installation Program which has been approved via annual sanction under

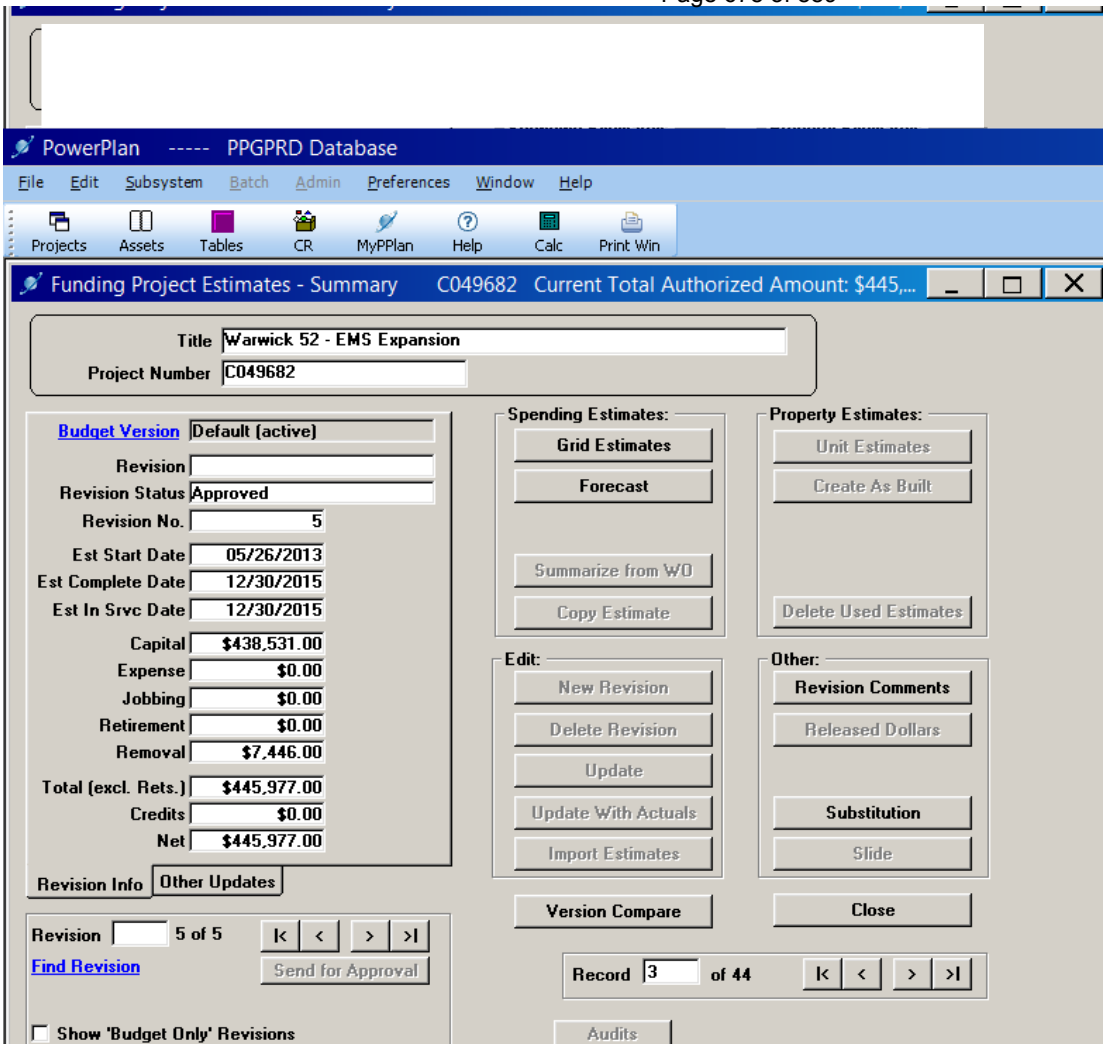
Related Projects:

Project Number:	Project Name:

Approvals

Line 1:	**Date**	10/29/2014 08:47:29	**Approver**	nearyal	DOA - Distribution Lev
Line 2:	**Date**	10/31/2014 08:11:20	**Approver**	Diconza, Glen L	DOA - Distribution Lev
Line 3:	**Date**	10/31/2014 10:10:08	**Approver**	Martuscello, Suzan E	DOA - Distribution Lev
Line 4:	**Date**	11/12/2014 12:56:16	**Approver**	Constable, Ryan	DOA - Distribution Lev
Line 5:	**Date**	11/13/2014 13:17:50	**Approver**	LaBarre, Alan T	DOA - Distribution Lev

*****Project Authorization is for Approved Revision Total Estimated Cost +10%*****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Projects Assets Tables CR MyPPlan Help Calc Print Win
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Title Warwick 52 - EMS Expansion
Project Number C049682
Budget Version Default (active)
Revision
Revision Status Approved
Revision No. 5
Est Start Date 05/26/2013
Est Complete Date 12/30/2015
Est In Srvc Date 12/30/2015
Capital $438,531.00
Expense $0.00
Jobbing $0.00
Retirement $0.00
Removal $7,446.00
Total (excl. Rets.) $445,977.00
Credits $0.00
Net $445,977.00
Revision Info
Other Updates
Revision 5 of 5
Find Revision
Send for Approval
Show 'Budget Only' Revisions
Spending Estimates:
Grid Estimates
Forecast
Summarize from WO
Copy Estimate
Property Estimates:
Unit Estimates
Create As Built
Delete Used Estimates
Edit:
New Revision
Delete Revision
Update
Update With Actuals
Import Estimates
Other:
Revision Comments
Released Dollars
Substitution
Slide
Version Compare
Close
Record 3 of 44
Audits

REDACTED - CEII Information has been Redacted

Change in DOA Request Form (Less than Million)

Version 9.0

Note: Fill data in the grey area and email form to **Mario Carlino** and the appropriate IP analyst.
Gas - Tracy Nguyen
Electric - Janice Flynn

*Date:	10/21/2014
*Operating Company:	The Narragansett Electric Co.
*PowerPlant Project Id:	C049682
*Project Name:	Warwick 52 - EMS Expansion
*Project Engineer:	Mary Foster
*Project Manager:	Tom Alexander

Latest Project Estimate

*Date of Latest Sanction:	5/29/2013

Total	Capex	Opex	Removal
$20,000	$20,000		

Revised Project Estimate

Total	Capex	Opex	Removal
$445,977	$438,531		$7,446

Cash Flows

Previous FY	Capex	Opex	Removal
$13,972	$13,972		

Current FY	Capex	Opex	Removal
$165,262	$163,046		$2,216

FY+1	Capex	Opex	Removal
$264,911	$259,681		$5,230

FY+2	Capex	Opex	Removal
$1,832	$1,832		

Customer Contribution

Reason for Revision

☑	Revised forecast either exceeds or is lower than the Approved Amount - Project Still In Process
	New Project Estimated Completion Date: 4/29/2016
☐	Actual Spending either exceeds or is lower than the Approved Amount – Project is Complete

Reason for Increased Spending (Please expand the row height if box doesn't fit)

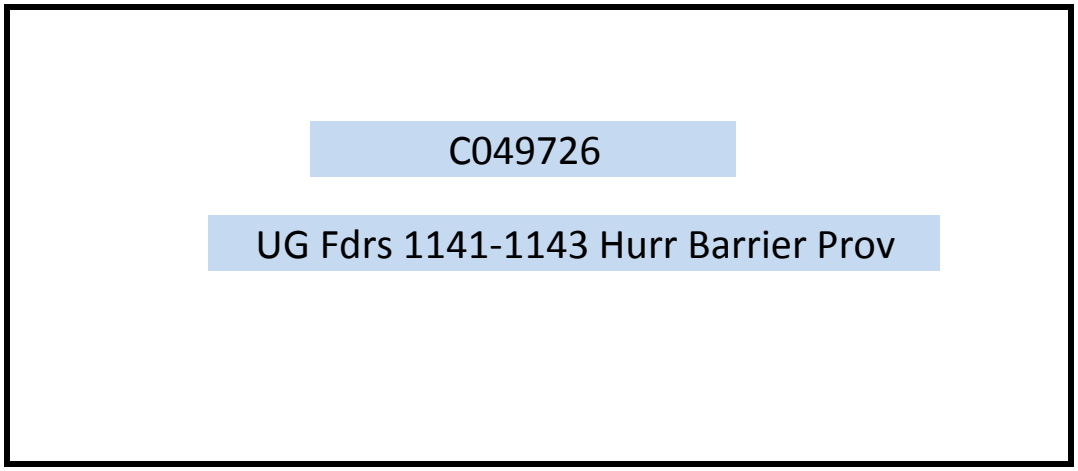
☑	**Change in Scope (Material, Labor or Other)**

Change in DOA Request Form (Less than Million)

	The original scope of the EMS Expansion project based on the strategy paper has expanded to include replacement of the 52F3 recloser and regulators at Warwick. This work was completed recently under a damage failure situation but, captured under this FP.
☐	**Resource Allocation (Schedule, Delay, OT, or Contractor)**
☑	**Low / High Estimate**
	The original sanction provided funding through preliminary engineering only. The re-sanctioning of this project is based on the "planning grade estimate" developed by ECOE and accounts for all phases of this project.
☐	**External Forces (Permitting Requirements, Weather, Contractor Issues, etc)**

In-service Dates

*Original In-service Date:	12/30/2014
*Revised In-service Date:	12/30/2015


C049726
UG Fdrs 1141-1143 Hurr Barrier Prov

5360-Narragansett Electric and Gas
Project Revision Detail Report

Fund Project Number: C049726 **USSC #:**

Revision: 4 **Budget Version:** Default

Project Title: UG Fdrs 1141-1143 Hurr Barrier Prov

Project Description: Feeders 1141 and 1143 out of Franklin Square substation in Providence supply a primary-metered service to the Fox Point Hurricane Barrier, owned and operated by the US Army Corps of Engineers. This project covers expenditures necessary to replace existing paper-lead cable on 1141 and 1143 in coordination with the Army Corps ; upgrades and

Project Status: open

Responsible Person: CURLEY, JOSEPH **Initiator:** Livingston, Claire L

Spending Rationale: Asset Condition **Funding Type:** P Electric Distribution Line RI

Budget Class: Asset Replacement

Capital by Category:

Program Code:

Project Risk Score: 36 **Project Complexity Score:** 14

Project Schedule / Expenditures

Revision Status: Approved

Est Start Date: 5/29/2013 **Est Complete Date:** 6/4/2015

Est In-Service Date: 6/4/2015

TTD Actuals: $268,965 **As Of:** 10/3/2017

Cost Breakdown	Capital	Expense	Removal	Total	Credits
	$177,000	$3,000	$120,000	$300,000	$0

Justification / Risk Identification:

The US Army Corps of Engineers is proactively replacing switchgear and cable at their pump house station at the Fox Point Hurricane Barrier in Providence. Cable on the two circuits that supply this primary-metered service, 1141 and 1143, is paper-insulated lead-covered and was installed in the early 1960's when the service was first installed. In coordination the Army Corps' work, National Grid will replace existing cable with solid dielectric cable.

Project Scope:

Install 2900 ckt ft of 500 kcmil Cu 15 kV CN cable and miscellaneous underground equipment.
Remove 2400 ft of 3/C-500 kcmil Cu PILC cable, 350 ckt ft of 1/C-500 kcmil Cu PILC cable, and miscellaneous underground equipment.

Project Alternatives Considered:

CL 5/29/13 - Estimate rev 1 conceptual estimate for budget purposes: $250K (225K capital, 10K O&M, 15K removal).
CL 5/29/13 - Estimate rev 2 - $30K for eng/design.
CL 5/29/13 - majority of spending placed in FY14, but timing of actual spend is dependent on Army Corps' schedule which is still to be determined.

Additional Notes:

Re-Sanction from $210K to $300K document attached. Transportation was understated by 10K. Also, asbestos removal was not included on the original estimate for 20K. Because of the multiple starts and stops on this project due to snow there was an additional 60K in Labor and Labor Overheads bringing the total project cost to 300K. Sanction from $30k to $210k email sent from Julie Spaziano. Document attached. Details on justification and scope tab.This project was approved for 30K in May, 2013. The original 30K estimate was for Engineering & Design costs.

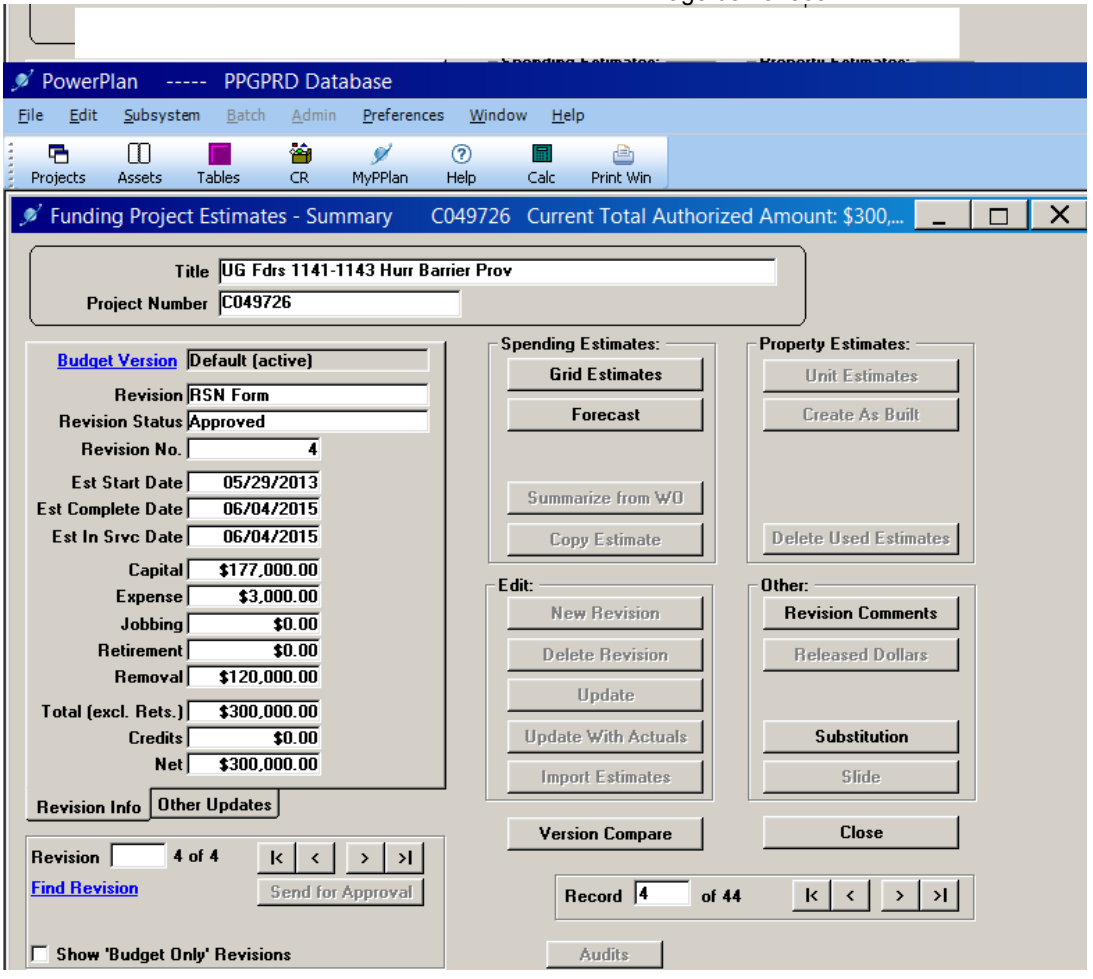
Related Projects:

Project Number:	Project Name:

Approvals

Line 1:	**Date**	9/2/2015 12:23:03	**Approver**	curljo	DOA - Distribution Lev
Line 2:	**Date**	9/4/2015 11:56:56	**Approver**	Park, Michelle L	DOA - Distribution Lev
Line 3:	**Date**	9/17/2015 09:27:36	**Approver**	Constable, Ryan	DOA - Distribution Lev
Line 4:	**Date**	9/25/2015 08:23:25	**Approver**	Cox, Roger D	DOA - Distribution Lev
Line 5:	**Date**	9/29/2015 09:19:50	**Approver**	LaBarre, Alan T	DOA - Distribution Lev

*****Project Authorization is for Approved Revision Total Estimated Cost +10%*****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Title UG Fdrs 1141-1143 Hurr Barrier Prov
Project Number C049726
Budget Version Default (active)
Revision RSN Form
Revision Status Approved
Revision No. 4
Est Start Date 05/29/2013
Est Complete Date 06/04/2015
Est In Srvc Date 06/04/2015
Capital $177,000.00
Expense $3,000.00
Jobbing $0.00
Retirement $0.00
Removal $120,000.00
Total (excl. Rets.) $300,000.00
Credits $0.00
Net $300,000.00
Revision Info
Other Updates
Revision 4 of 4
Find Revision
Send for Approval
Show 'Budget Only' Revisions
Spending Estimates:
Grid Estimates
Forecast
Summarize from WO
Copy Estimate
Property Estimates:
Unit Estimates
Create As Built
Delete Used Estimates
Edit:
New Revision
Delete Revision
Update
Update With Actuals
Import Estimates
Other:
Revision Comments
Released Dollars
Substitution
Slide
Version Compare
Close
Record 4 of 44
Audits

Change in DOA Request Form (Less than Million)

Version 9.0

Note: Fill data in the grey area and email form to **Mario Carlino** and the appropriate IP analyst.
Gas - Tracy Nguyen
Electric - Janice Flynn

*Date:	8/31/2015
*Operating Company:	The Narragansett Electric Co.
*PowerPlant Project Id:	C049726
*Project Name:	UG Fdrs 1141-1143 Hurr Barrier Prov
*Project Engineer:	Chris Montalto
*Project Manager:	Joe Curley

Latest Project Estimate

*Date of Latest Sanction:	2/6/2014

Total	Capex	Opex	Removal
$210,000	$123,900	$2,100	$84,000

Revised Project Estimate

Total	Capex	Opex	Removal
$300,000	$177,000	$3,000	$120,000

Cash Flows

Previous FY	Capex	Opex	Removal
$70,000	$41,300	$700	$28,000

Current FY	Capex	Opex	Removal
$230,000	$135,700	$2,300	$92,000

FY+1	Capex	Opex	Removal
$0			

FY+2	Capex	Opex	Removal
$0			

Customer Contribution

Reason for Revision

☐	Revised forecast either exceeds or is lower than the Approved Amount - Project Still In Process
	New Project Estimated Completion Date:
☑	Actual Spending either exceeds or is lower than the Approved Amount – Project is Complete

Reason for Increased Spending (Please expand the row height if box doesn't fit)

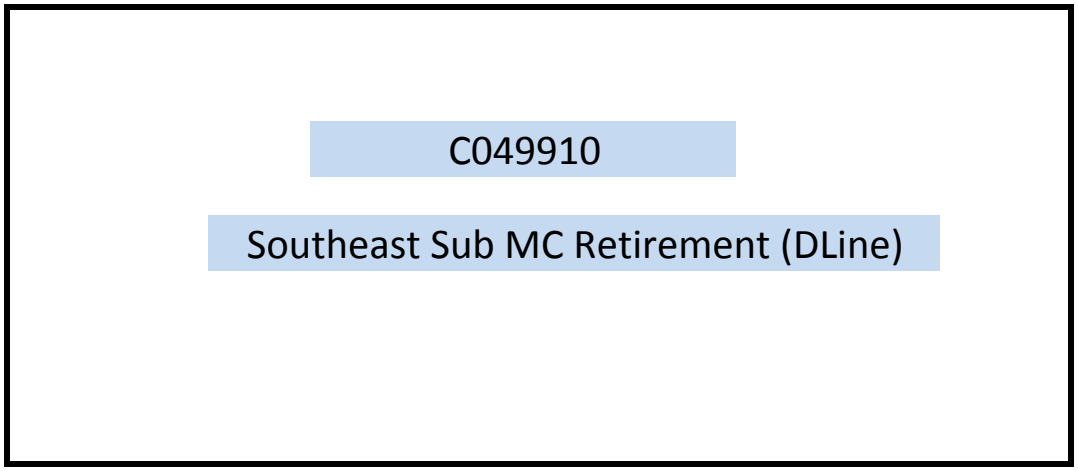
☐	**Change in Scope (Material, Labor or Other)**

Change in DOA Request Form (Less than Million)

☐	**Resource Allocation (Schedule, Delay, OT, or Contractor)**
☑	**Low / High Estimate**
	Transportation was understated by 10K. Also, asbestos removal was not included on the original estimate for 20K. Because of the multiple starts and stops on this project due to snow there was an additional 60K in Labor and Labor Overheads bringing the total project cost to 300K.
☐	**External Forces (Permitting Requirements, Weather, Contractor Issues, etc)**

In-service Dates

*Original In-service Date:	12/31/2014
*Revised In-service Date:	6/4/2015


C049910
Southeast Sub MC Retirement (DLine)

5360-Narragansett Electric and Gas
Project Revision Detail Report

Fund Project Number: C049910 **USSC #:** USSC-16-157

Revision: 2 **Budget Version:** Default

Project Title: Southeast Sub MC Retirement (DLine)

Project Description: Retire Southeast substation and supply load from the existing area 13.8kV distribution system.

Project Status: open

Responsible Person: MARCEAU, DANIEL **Initiator:** Vaz, Jack P

Spending Rationale: Asset Condition **Funding Type:** P Electric Distribution Line RI

Budget Class: Asset Replacement

Capital by Category:

Program Code:

Project Risk Score: 41 **Project Complexity Score:** 11

Project Schedule / Expenditures

Revision Status: Approved

Est Start Date: 6/6/2013 **Est Complete Date:** 3/31/2018

Est In-Service Date: 2/28/2018

TTD Actuals: $1,532,645 **As Of:** 10/4/2017

Cost Breakdown	Capital	Expense	Removal	Total	Credits
	$1,070,000	$120,000	$130,000	$1,320,000	$0

Justification / Risk Identification:

Southeast Substation is a 13.8/4.16kV station with a single 7 MVA transformer supplying three feeders. This station supplies distribution load in the south eastern section of the City of Pawtucket. It serves approximately 780 customers with 2.74MW of load. The station has two 4.16kV feeder ties, one to the Cottage 109J1 feeder and one to the Pawtucket 148J7 feeder. There is insufficient tie capacity to offload this station on peak. Approximately 1.2MW of load or 340 customers would remain un-served for loss of the station transformer.

Project Scope:

PLAN 1 - Retire the Substation ($0.85M): This Plan recommends retirement of this substation and supplying its load from the existing area 13.8kV distribution system. A mixture of conversions to the existing 13.8kV system and the use of pole mounted 13.8/4.16kV step-down transformers will be utilized to reduce costs. The Conceptual Estimate of this plan is $0.85M.

Project Alternatives Considered:

PLAN 2 - Replace the Metal-Clad Switchgear ($2.30M): This Plan recommends replacing the existing metal-clad switchgear at the station with new in-kind metal-clad switchgear. New ductline and feeder getaway cables would be installed from the new switchgear to each riser pole. Each feeder would be cutover from the existing switchgear to the new switchgear. The Conceptual Estimate of this plan is $2.30M.

Additional Notes:

Plan 1 is recommended for implementation. It is significantly more economical over the alternate plan; Plan is in-line with the long-term plan for this area to reduce the 4.16kV distribution and to utilize the existing 13.8kV distribution; Plan retires assets that are no longer reliable.

Related Projects:

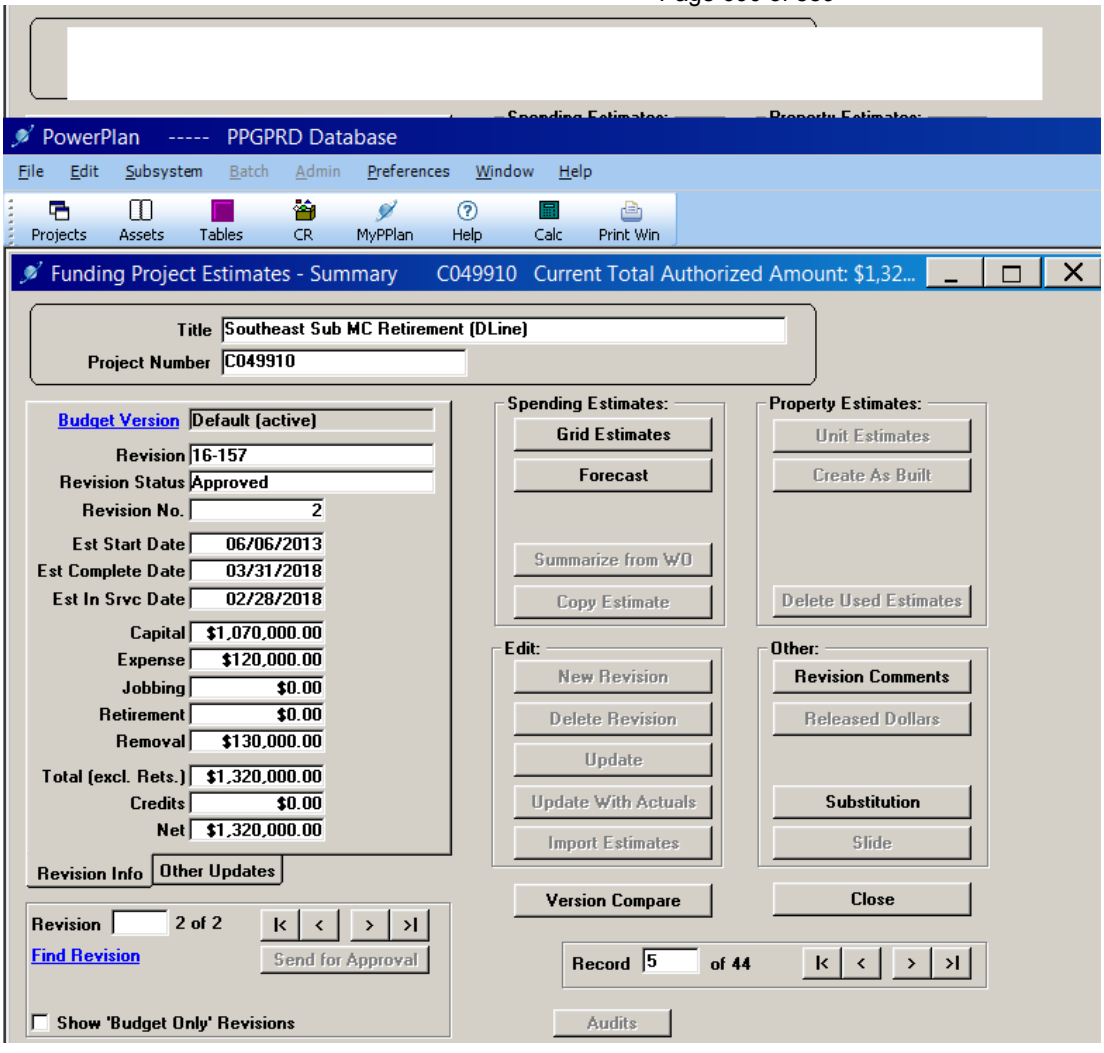
Project Number:	Project Name:

Approvals

Line 1:	**Date**	3/31/2016 11:46:42	**Approver**	carlim	USSC Approver
Line 2:	**Date**		**Approver**		
Line 3:	**Date**		**Approver**		
Line 4:	**Date**		**Approver**		
Line 5:	**Date**		**Approver**		

Project Authorization is for Approved Revision Total Estimated Cost +10%

REDACTED - CEII Information has been Redacted



Resanction Request

nationalgrid

Title:	Southeast Sub MC Retirement	**Sanction Paper #:**	USSC-16-157
Project #:	C049910, C051272	**Sanction Type:**	Resanction
Operating Company:	The Narragansett Electric Co.	**Date of Request:**	March 29, 2016
Author:	Jack P. Vaz	**Sponsor:**	John Gavin, VP Electric Asset Management
Utility Service:	Electricity T&D	**Project Manager:**	Joe Curley

1 *Executive Summary*

This paper requests the re-sanction of project **C049910 and C051272** in the amount of **$1.420M** with a tolerance of +/- 10% for the purposes of Engineering, Procurement and full construction of the project.

This sanction amount is $1.420M broken down into:
$1.070M Capex
$0.120M Opex
$0.230M Removal

Note the originally requested sanction amount of $0.808M

2 *Re-sanction Details*

2.1 Project Summary

Southeast substation is a 13.8/4.16kV station with a single 7 MVA transformer supplying three feeders. It was built in the 1950's and supplies distribution load in the City of Pawtucket. It serves approximately 780 customers with 2.74MW of load. This station is one of eleven 13.8/4.16kV substations in the Pawtucket area. These stations are primarily single metal-clad switchgear modules supplied by a single LTC transformer. They are all supplied from 13.8kV distribution circuits.

It is difficult to take stations of this type out of service for routine maintenance due to the single transformer nature of the design. The loads on the 4.16kV distribution stations are backed up through the use of feeder ties from adjacent stations. The existing feeder tie capacity is not always sufficient to offload a station to facilitate maintenance. In addition, there is no metering in these stations to accurately determine feeder or station loading making operating these stations even more difficult.

The 1950's vintage metal-clad switchgear at Southeast substation has been identified for replacement in accordance with the Metal-clad Switchgear Strategy. The bus insulation in this switchgear is prone to failure, the gaskets are at the end-of-life and there are signs of moisture ingress and rust on the flooring. The flooring is warped making it difficult to rack the breakers in and out. The low side of the transformer is

connected via enclosed bus, known as throat connected, and this is difficult to spare in case of an inadvertent failure.

The recommended plan to address the concerns at Southeast is to retire the station. The station load will be supplied from the existing area 13.8kV distribution system thru conversions and the use of pole mounted step-down transformers. This is the most economical approach for this area and in-line with the long term plan for this area to continue to expand the 13.8kV distribution system.

2.2 Summary of Projects

Project Number	Project Type (Elec only)	Project Title	Estimate Amount ($M)
C049910	D-Line	Southeast Sub MC Retirement (D-Line)	1.320
C051272	D-Sub	Southeast Sub MC Retirement (D-Sub)	0.100
		Total	1.420

2.3 Prior Sanctioning History

Date	Governance Body	Sanctioned Amount	Paper Title	Sanction Type	Paper Reference Number	Tolerance
06/07/13	Power Plant	$0.808M	Southeast Sub MC Retirement	Full	N/A	±10%

Over / Under Expenditure Analysis

Summary Analysis ($M)	Capex	Opex	Removal	Total
Re-sanction Amount	1.070	0.120	0.230	1.420
Latest Approval	0.540	0.060	0.208	0.808
Change*	0.530	0.060	0.022	0.612

Change = (Re-sanction – Amount Latest Approval)

Resanction Request

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2.4 Cost Summary Table

Project Number	Project Title	Project Estimate Level (%)	Spend	Prior Yrs	Current Planning Horizon ($M) FY17 2016/17	FY18 2017/18	FY19 2018/19	Total
C049910	Southeast Sub MC Retirement (D-Line)	+/- 10%	CapEx	0.170	-	0.900	-	1.070
			OpEx	-	-	0.120	-	0.120
			Removal	0.010	-	0.120	-	0.130
			Total	0.180	-	1.140	-	1.320
C051272	Southeast Sub MC Retirement (D-Sub)	+/- 10%	CapEx	-	-	-	-	-
			OpEx	-	-	-	-	-
			Removal	-	-	0.100	-	0.100
			Total	-	-	0.100	-	0.100
Total Project Sanction			CapEx	0.170	-	0.900	-	1.070
			OpEx	-	-	0.120	-	0.120
			Removal	0.010	-	0.220	-	0.230
			Total	0.180	-	1.240	-	1.420

2.5 Business Plan

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
FY17-21 NE Distribution Budget	◉ Yes ○ No	◉ Over ○ Under ○ N/A	$0.075M

2.6 Drivers

The main driver of the cost increase was the asset condition of the existing 4kV assets. Removing the pole mounted step-down transformers from the project scope and adding conversion work was recommended by Operations and agreed to by Engineering to realize crew mobilization and outage coordination efficiencies. Without this coordination, it is expected the asset work would have been progressed in five to ten years requiring a repeated mobilization.

2.6.1 Detailed Analysis Table

The following table indicates the major key variations that account for the difference between the original sanction amount and the requested re-sanction amount.

Detail Analysis (M's)	Over/Under Expenditure?	Amount
Step-Down Removals	☒ Over ☐ Under	$0.612M

2.6.2 Explanation of Key Variations

The original scope document recommended the use of step-down transformers to reduce the cost of the conversion. During final design a decision was made to remove the step-down transformers and to convert the entire area because of the poor condition of the pole plant.

2.7 If cost > approved Business Plan how will this be funded?

Re-allocation of funds within the portfolio will be managed by Resource Planning to meet jurisdictional budgetary, statutory, and regulatory requirements.

2.8 Key Milestones

Milestone	Target Date: (Month/Year)
Project Re-sanction	Mar 2016
Construction Start	Apr 2017
Construction Complete	Jan 2018
Project Close Out	Feb 2018
Closure Paper	Mar 2018

2.9 Next Planned Sanction Review

Date (Month/Year)	Purpose of Sanction Review
Mar 2018	Closure Paper

3 *Statements of Support*

3.1 Supporters

The supporters listed have aligned their part of the business to support the project.

Department	Individual	Responsibilities
Investment Planning	Glen DiConza	Endorses relative to distribution 5-year plan or emergent work
Resource Planning	Anne Wyman	Endorses Resources, cost estimate, schedule, and Portfolio Alignment
Distribution Asset Management	Alan LaBarre	Endorses scope, design, conformance with design standards

3.2 Reviewers

The reviewers have provided feedback on the content/language of the paper

Function	Individual
Finance	Fowler, Keith
Regulatory	Zschokke, Peter
Jurisdictional Delegates	Patterson, Jim
Procurement	Curran, Art
Control Center	Gallagher, Mike

Resanction Request

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4 *Decisions*

I:

(a) APPROVE this paper and the investment of **$1.420M** and a tolerance of +/- 10%

(b) NOTE that **Joe Curley** is the Project Manager and has the approved financial delegation.

Signature.....Date.....3/30/16

Marie Jordan, Senior Vice President – Electric Process & Engineering

5 *Appendices*

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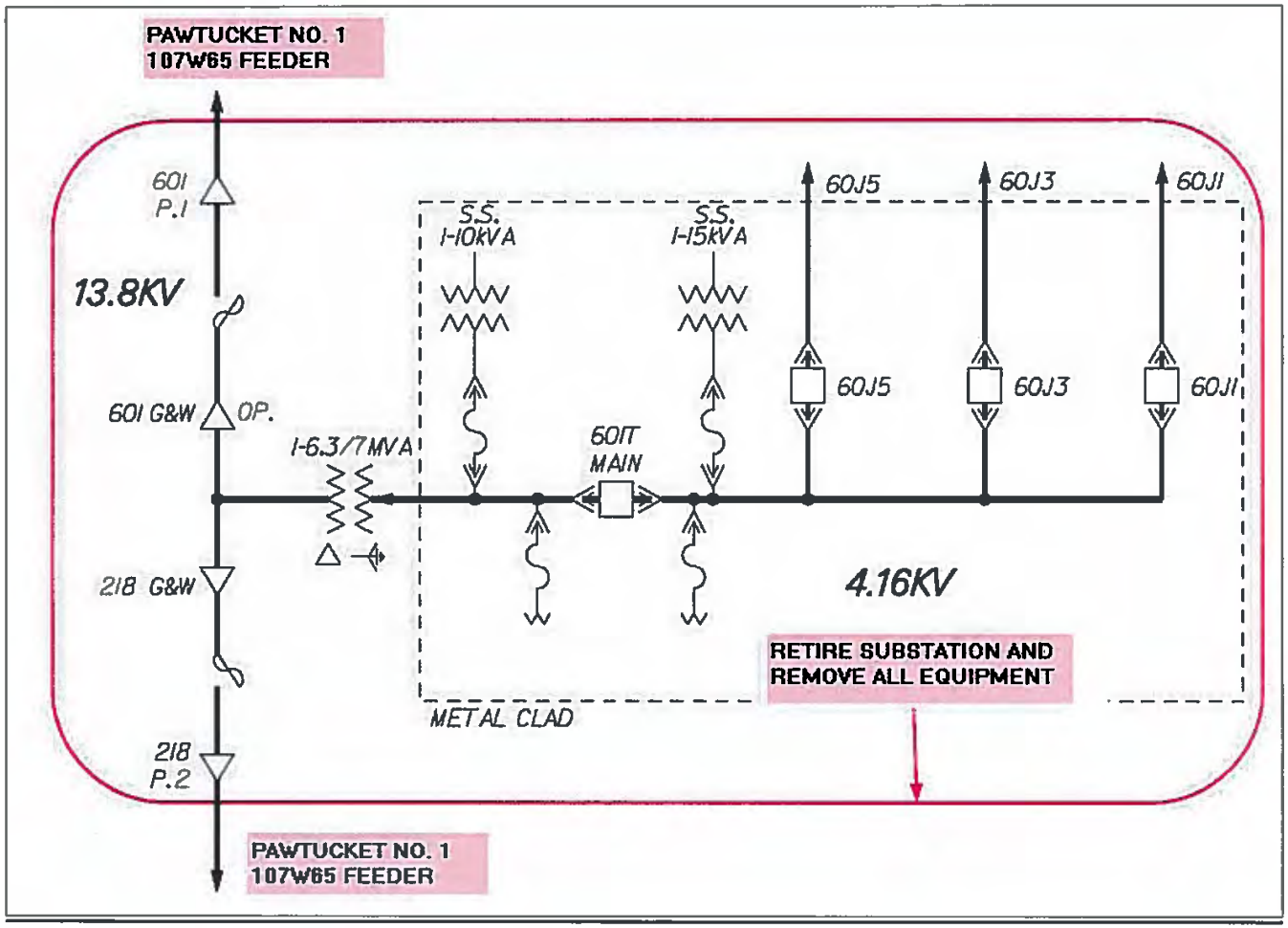

SOUTHEAST SUBSTATION ONE-LINE

Resanction Request

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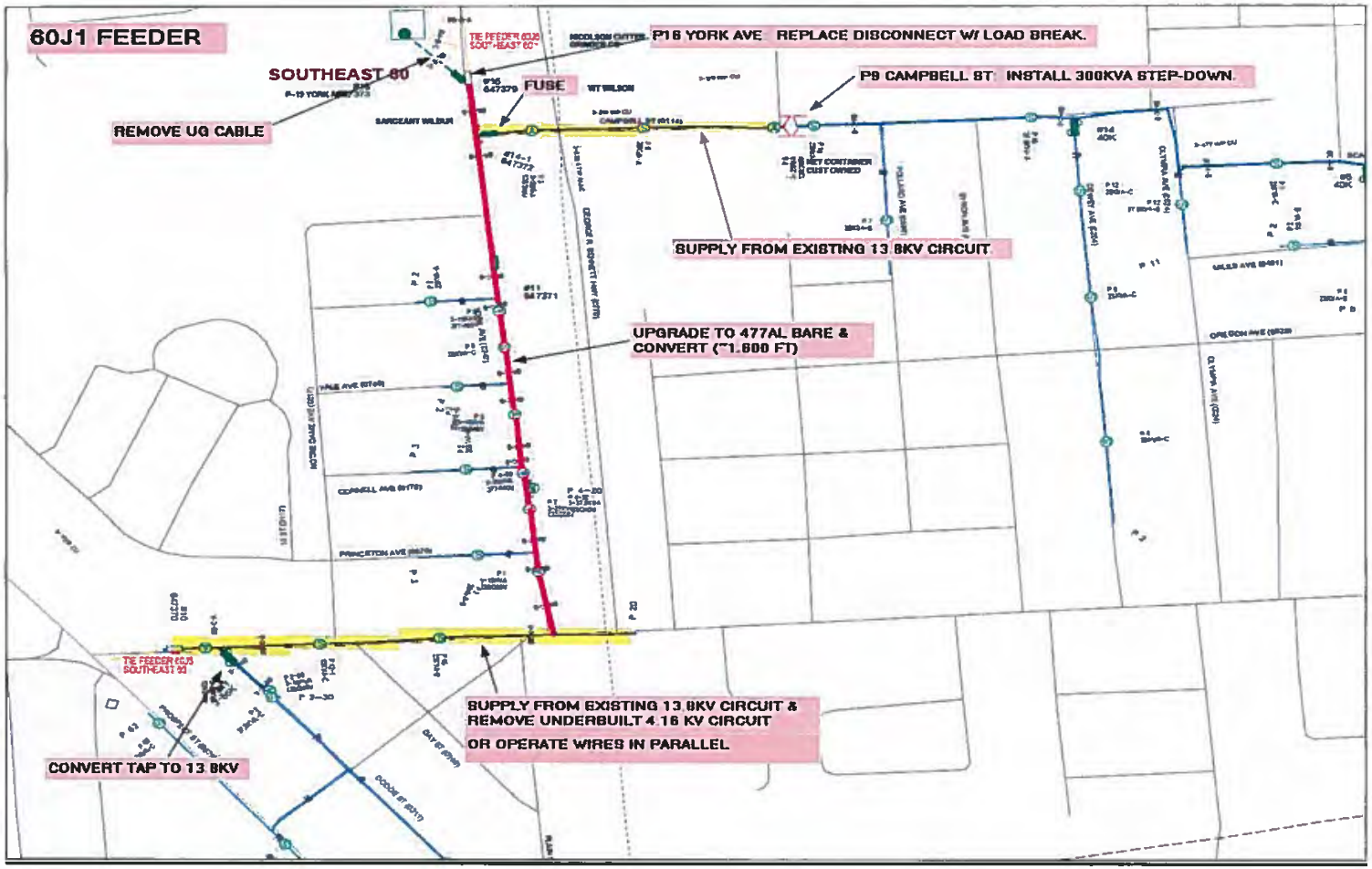
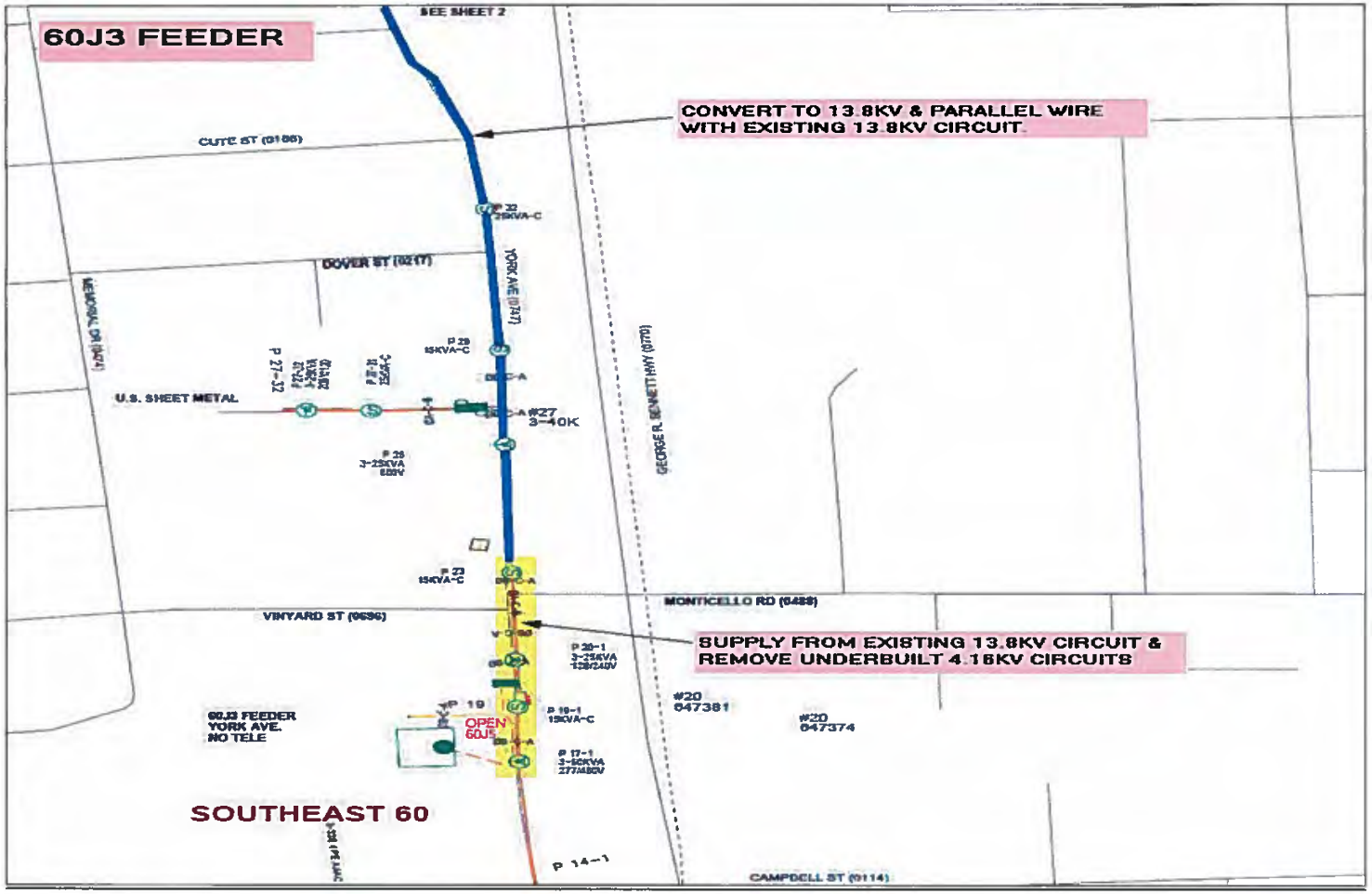


SOUTHEAST SUB 60J1 FEEDER CONVERSION

nationalgrid



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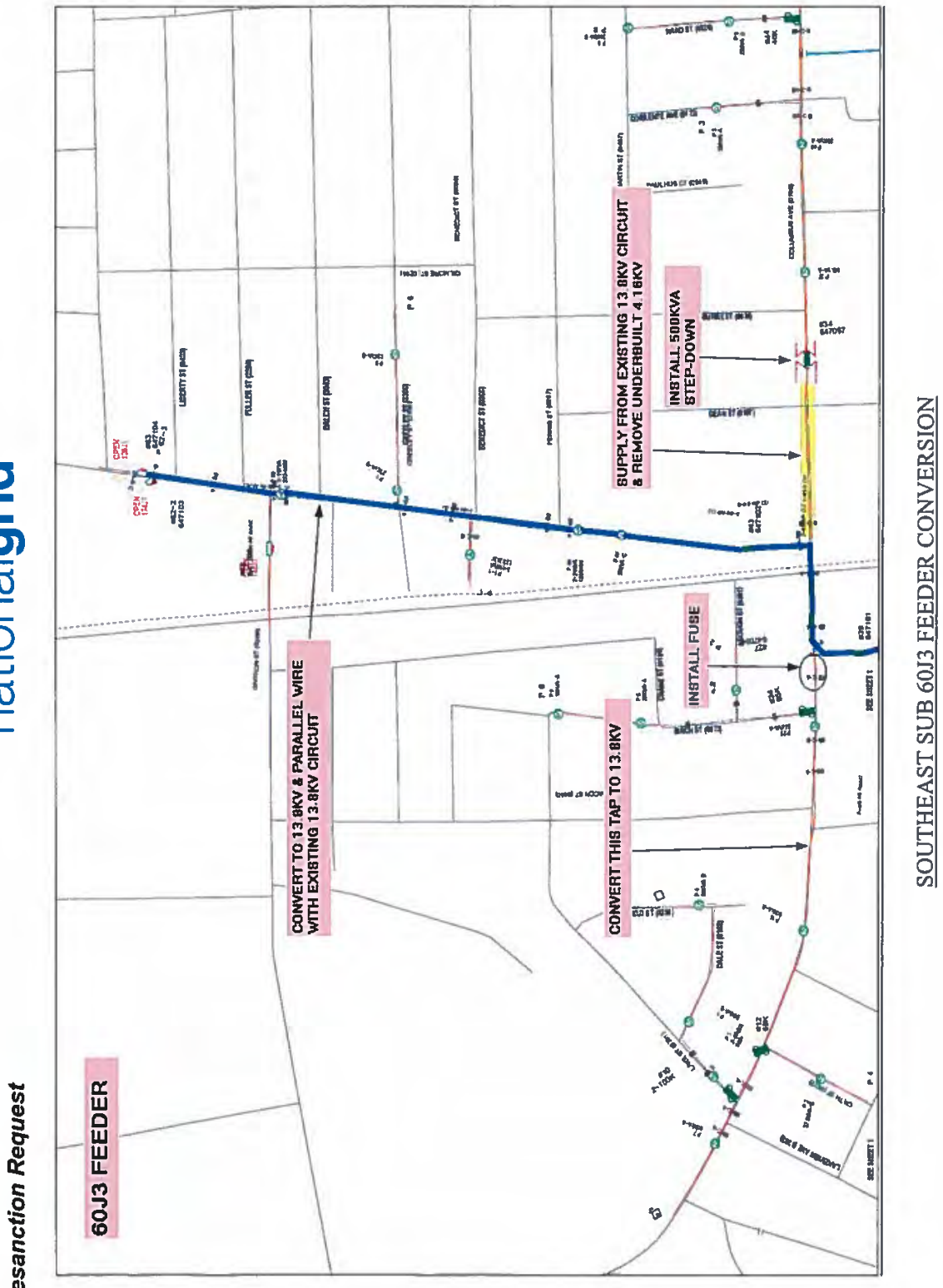
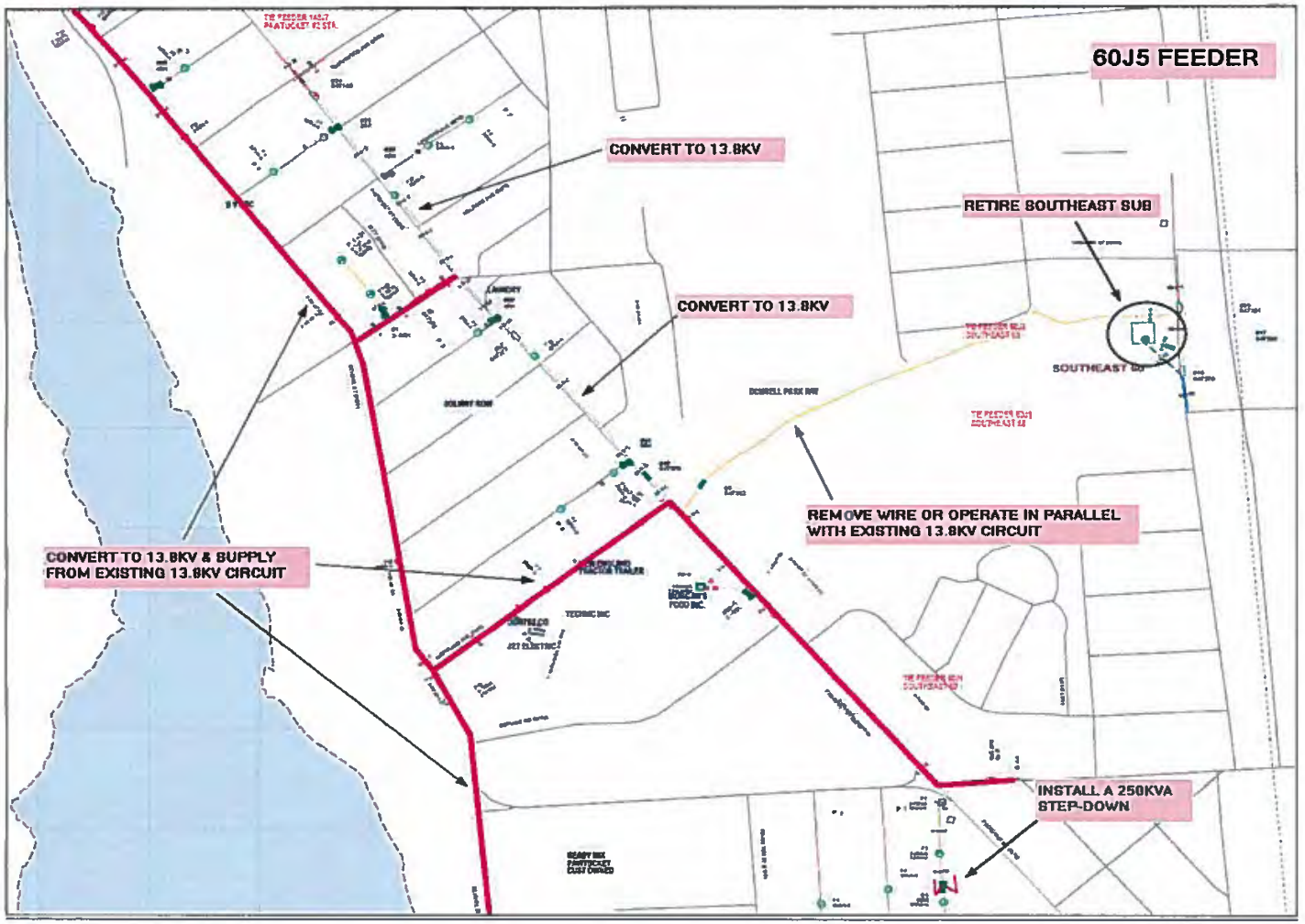

nationalgrid
Resanction Request
60J3 FEEDER
CONVERT TO 13.8KV & PARALLEL WIRE WITH EXISTING 13.8KV CIRCUIT
CONVERT THIS TAP TO 13.8KV
INSTALL FUSE
SUPPLY FROM EXISTING 13.8KV CIRCUIT & REMOVE UNDERBUILT 4.16KV
INSTALL 500KVA STEP-DOWN
SOUTHEAST SUB 60J3 FEEDER CONVERSION
Page 11 of 12
Southeast Metal Clad Retirement Sanction
Uncontrolled When Printed

nationalgrid



SOUTHEAST SUB 60J5 FEEDER CONVERSION

C049981

Nsnvlle 127W41 New Customer Load

5360-Narragansett Electric and Gas
Project Revision Detail Report

Fund Project Number:	C049981	**USSC #:**	USSC-15-161
Revision:	4	**Budget Version:**	Default
Project Title:	Nsnvlle 127W41 New Customer Load		
Project Description:	In 2014 a new commercial customer¿s expected load will exceed the only area Nasonville 127W41 distribution feeder SN rating. Additionally, new load will reduce the W41 feeder support to other area customers. The proposed project increase the W41 feeder SN rating, provides additional capacity for other commercial loads, and transfers a portion of		

Project Status:	open		
Responsible Person:	BOYLE, RICHARD	**Initiator:**	Lester, Roderick A
Spending Rationale:	Customer Request/Public Requir	**Funding Type:**	P Electric Distribution Line RI
Budget Class:	New Business - Commercial		
Capital by Category:			
Program Code:			
Project Risk Score:	49	**Project Complexity Score:**	20

Project Schedule / Expenditures

Revision Status:	Approved		
Est Start Date:	6/7/2013	**Est Complete Date:**	2/28/2016
Est In-Service Date:	11/30/2015		
TTD Actuals:	$1,985,903	**As Of:**	10/3/2017

Cost Breakdown	Capital	Expense	Removal	Total	Credits
	$1,998,000	$283,000	$298,000	$2,579,000	$0

Justification / Risk Identification:

Daniele Foods, an existing customer on Nasonville feeder 127W41 in Burrillville is adding 6 MVA of new load by Summer 2014. This added load will result in 127W41 projected peak load 120% of Summer Normal (SN) rating of the first limiting element and 101% of the second limiting SN element. Another Nasonville feeder W42 has spare capacity and will be extended double circuit on existing poles on existing distribution right of way to the area near Daniele.

Project Scope:

Install 94 ckt ft of 1000kcmil Al 15kV cable on 127W41 from MH412 to MH413 at the Nasonville station. Install 10,000 ckt ft of 477 Al spacer cable on 127W42 and additional overhead equipment double circuit along existing right of way from Douglas Pike to Victory Hwy.

Project Alternatives Considered:

Alternate #1 to extend 127W42 from Nasonville substation to P222 Victory Hwy with ~14,300 ft double circuit construction on public roads is more costly.
Alternate #2 to increase capacity on 127W41 was not developed because it was more costly and resulted in MWh criteria violation.

Additional Notes:

Estimate revision #1 8/05/2013 - RL (Estimate for Budget Purposes) = $718,000 - total
Estimate revision #2 08/26/2013 - RL (Estimate for Preliminary Engineering / Design) = $25,000 - total

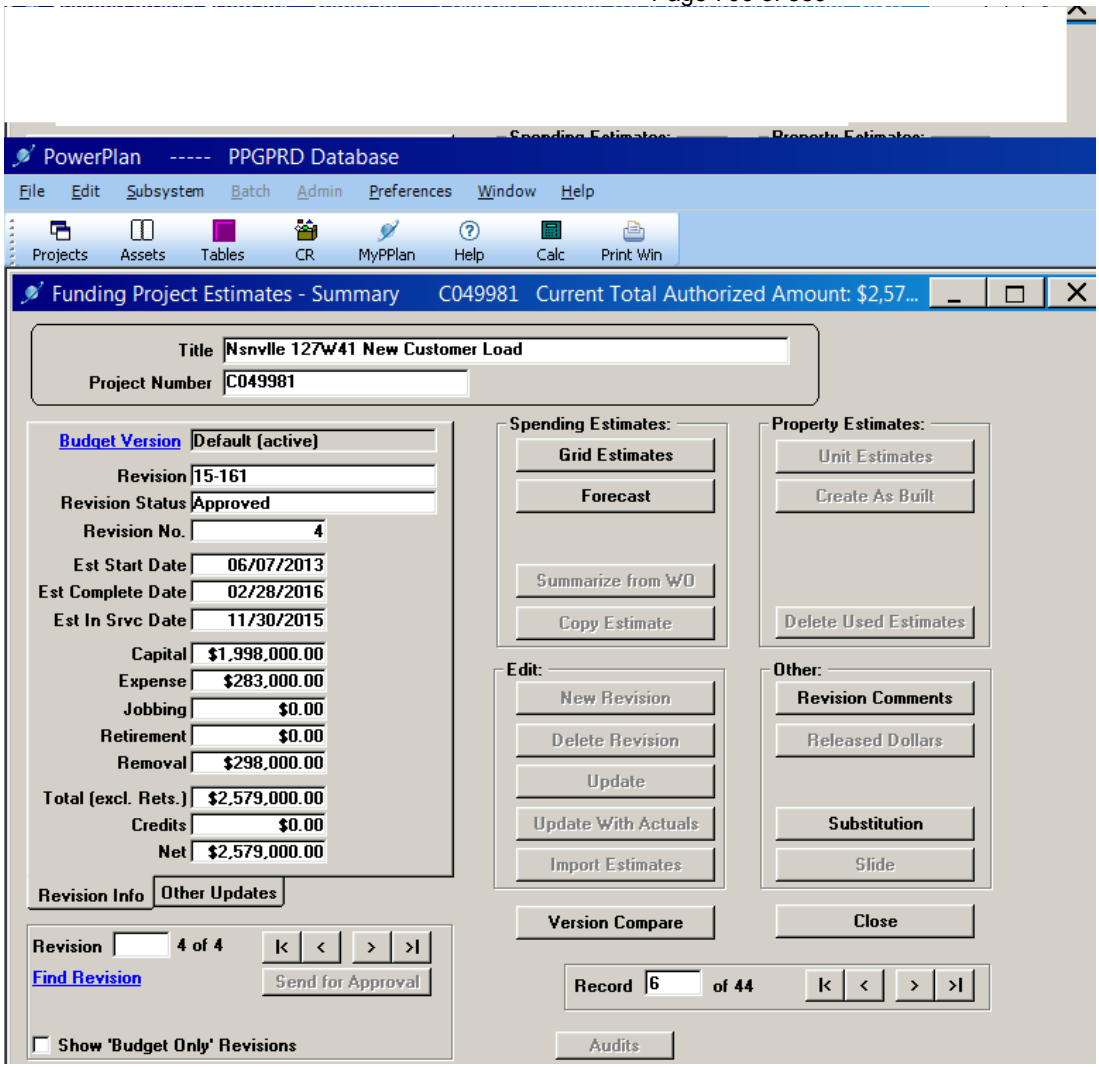
Related Projects:

Project Number: **Project Name:**

Approvals

Line 1:	**Date**	7/27/2015 14:16:17	**Approver**	carlim	USSC Approver
Line 2:	**Date**		**Approver**		
Line 3:	**Date**		**Approver**		
Line 4:	**Date**		**Approver**		
Line 5:	**Date**		**Approver**		

*****Project Authorization is for Approved Revision Total Estimated Cost +10%*****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Projects Assets Tables CR MyPPlan Help Calc Print Win
Funding Project Estimates - Summary C049981 Current Total Authorized Amount: $2,57...
Title Nsnvlle 127W41 New Customer Load
Project Number C049981
Budget Version Default (active)
Revision 15-161
Revision Status Approved
Revision No. 4
Est Start Date 06/07/2013
Est Complete Date 02/28/2016
Est In Srvc Date 11/30/2015
Capital $1,998,000.00
Expense $283,000.00
Jobbing $0.00
Retirement $0.00
Removal $298,000.00
Total (excl. Rets.) $2,579,000.00
Credits $0.00
Net $2,579,000.00
Revision Info
Other Updates
Revision 4 of 4
Find Revision
Send for Approval
Show 'Budget Only' Revisions
Spending Estimates:
Grid Estimates
Forecast
Summarize from WO
Copy Estimate
Property Estimates:
Unit Estimates
Create As Built
Delete Used Estimates
Edit:
New Revision
Delete Revision
Update
Update With Actuals
Import Estimates
Other:
Revision Comments
Released Dollars
Substitution
Slide
Version Compare
Close
Record 6 of 44
Audits

Resanction Request

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Title:	Nasonville 127W41 New Customer Load	**Sanction Paper #:**	USSC-15-161
Project #:	C049981	**Sanction Type:**	Resanction
Operating Company:	The Narragansett Electric Co.	**Date of Request:**	07/21/2015
Author:	Richard Boyle	**Sponsor:**	John Gavin, Vice President, Electric Asset Management
Utility Service:	Electricity T&D	**Project Manager:**	Richard Boyle

1 *Executive Summary*

This paper requests the resanction of C049981 in the amount $2.579M with a tolerance of +/- 10% for the purposes of full implementation.

This sanction amount is $2.579M broken down into:

$1.999M Capex
$0.283M Opex
$0.297M Removal

Note the originally requested sanction amount of $0.728M

2 *Resanction Details*

2.1 Project Summary

Nasonville 127W41is projected to exceed the feeder's Summer Normal (SN) rating in 2015, with the feeder growth and newly added large customer load. The feeder requires immediate load relief, which may be attained through the extension of the 127W42 along the existing right-of-way of the 127W43. The 127W42 will have much of the 127W41 load transferred.

2.2 Summary of Projects

Project Number	Project Type (Elect only)	Project Title	Estimate Amount ($M)
C049981	D-Line	Nasonville 127W41 new Customer Load	2.579
		Total	2.579

Resanction Request

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2.3 Prior Sanctioning History

Previously approved sanctions are listed below.

Date	Governance Body	Sanctioned Amount	Potential Project Investment	Paper Title	Sanction Type	Paper Reference Number	Tolerance
9/26/2013	PowerPlant	$0.728M	$0.728	Nsnville 127W41 New Customer load	<$1M DOA Approval	N/A	N/A

Over / Under Expenditure Analysis

Summary Analysis ($M)	Capex	Opex	Removal	Total
Resanction Amount	1.999	0.283	0.297	2.579
Latest Approval	0.700	0.018	0.010	0.728
Change*	1.299	0.265	0.287	1.851

Change = (Re-sanction – Amount Latest Approval)

2.4 Cost Summary Table

Project Number	Project Title	Project Estimate Level (%)	Spend ($M)	Prior Yrs	Current Planning Horizon Yr. 1 2015/16	Yr. 2 2016/17	Yr. 3 2017/18	Yr. 4 2018/19	Yr. 5 2019/20	Yr. 6 + 2020/21	Total
C049981	Nasonville 127W41 new Customer Load	+/- 10%	CapEx	0.112	1.886	0.000	0.000	0.000	0.000	0.000	1.998
			OpEx	0.011	0.272	0.000	0.000	0.000	0.000	0.000	0.283
			Removal	0.002	0.296	0.000	0.000	0.000	0.000	0.000	0.298
			Total	0.125	2.454	0.000	0.000	0.000	0.000	0.000	2.579

2.5 Business Plan

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
FY16-20 Budget: New England Electric Distribution	◉ Yes ○ No	◉ Over ○ Under ○ N/A	$1.916

Resanction Request

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2.6 Drivers

2.6.1 Detailed Analysis Table

The following table indicates the major key variations that account for the difference between the original sanction amount and the requested resanction amount.

Detail Analysis (M's)	Over/Under Expenditure?	Amount
Swamp Matting	☒ Over ☐ Under	$0.784M
Specialty/Off Road Equipment	☒ Over ☐ Under	$0.255M
Environmental permitting costs	☒ Over ☐ Under	$0.073M

2.6.2 Explanation of Key Variations

The conceptual estimate for this project was conducted in 2012 and did not capture the costs associated with accessing the ROW to accomplish the scope of work. The ROW in which this project takes place is predominantly wetlands and also contains highly sensitive cultural resources. There are limited access points in this ROW which require extensive swamp matting for protection of the environmentally sensitive areas and specialized off road equipment. These factors are the key variations in the conceptual and project estimates.

2.7 If cost > approved Business Plan how will this be funded?

Re-allocation of funds within the portfolio will be managed by Resource Planning to meet jurisdictional budgetary, statutory and regulatory requirements.

2.8 Key Milestones

Milestone	Target Date: (Month/Year)
<$1M DOA Approval	September 2013
Engineering Design Complete - EDC	April 2015
Project Resanction	July 2015
Construction Start	August 2015
Ready For Load – RFL	November 2015
Construction Complete	November 2015
Project Closure Sanction	February 2016

2.9 Next Planned Sanction Review

Resanction Request

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Date (Month/Year)	Purpose of Sanction Review
February 2016	Project Closure

3 *Statements of Support*

3.1 Supporters

The supporters listed have aligned their part of the business to support the project.

Department	Individual	Responsibilities
Investment Planning	**Michelle Park**	**Endorses relative to 5-year business plan or emergent work**
Resource Planning	**Wyman, Anne**	**Endorses construction resources, cost estimate, schedule, and portfolio alignment**
Asset Management / Planning	**Labarre, Alan T.**	**Endorses scope, estimate, and schedule with the company's goals, strategies, and objectives**
Engineering and Design	**Brawley, Robert F.**	**Endorses scope, design, conformance with design standards**
Project Management	**Schneller, Andrew**	**Endorses resources, cost estimate, schedule**

3.2 Reviewers

The reviewers have provided feedback on the content/language of the paper

Function	Individual
Finance	Fowler, Keith
Regulatory	Zschokke, Peter
Jurisdictional Delegate	Patterson, Jim
Procurement	Curran, Art
Control Centers (CC)	Michael Gallagher

Resanction Request

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4 *Decisions*

I:

(a) APPROVE this paper and the investment of $2.579M and a tolerance of +/- 10%

(b) NOTE that Richard Boyle is the Project Manager and has the approved financial delegation.

Signature ..... Date 7/27/2017

Ross Turrini – acting Senior Vice President, Network Strategy

C050006

Hyde Ave MC Retirement (D-Line)

5360-Narragansett Electric and Gas
Project Revision Detail Report

Fund Project Number: C050006 **USSC #:** USSC-16-147

Revision: 2 **Budget Version:** Default

Project Title: Hyde Ave MC Retirement (D-Line)

Project Description: Retire Hyde Ave substation and supply load from existing 13.8kV system.

Project Status: open

Responsible Person: MARCEAU, DANIEL **Initiator:** Vaz, Jack P

Spending Rationale: Asset Condition **Funding Type:** P Electric Distribution Line RI

Budget Class: Asset Replacement

Capital by Category:

Program Code:

Project Risk Score: 41 **Project Complexity Score:** 11

Project Schedule / Expenditures

Revision Status: Approved

Est Start Date: 6/10/2013 **Est Complete Date:** 10/31/2016

Est In-Service Date: 9/30/2016

TTD Actuals: $2,976,443 **As Of:** 10/4/2017

Cost Breakdown	Capital	Expense	Removal	Total	Credits
	$1,672,000	$348,000	$374,000	$2,394,000	$0

Justification / Risk Identification:

Hyde Avenue Substation is a 13.8/4.16kV station with a single 5.25 MVA transformer supplying two feeders. It serves approximately 1745 customers with 2.90MW of load.Hyde Ave Substation is one of eleven 13.8/4.16kV substations in the Pawtucket area. These stations are primarily single metal-clad switchgear modules supplied by a single LTC transformer.

It is challenging to take these stations out of service for routine maintenance due to the inherent design of the stations

Project Scope:

Retire the Substation: The Preferred Plan recommends retirement of this substation and supplying its load from the existing area 13.8kV distribution system. A mixture of conversions to the existing 13.8kV system and the use of pole mounted 13.8/4.16kV step-down transformers will be utilized to reduce costs. The Conceptual Estimate of this plan is $0.86M.

Project Alternatives Considered:

Replace the Metal-Clad Switchgear: The Alternate Plan recommends replacing the existing metal-clad switchgear at the station with new in-kind metal-clad switchgear. New ductline and feeder getaway cables would be installed from the new switchgear to each riser pole. Each feeder would be cutover from the existing switchgear to the new switchgear. The Conceptual Estimate of this plan is $2.00M.

Additional Notes:

Retirement of the substation is recommended for implementation. It is more economical over the alternate plan; Plan is in-line with the long-term plan for this area to reduce the 4.16kV distribution and to utilize the existing 13.8kV distribution; Plan retires assets that are no longer reliable.

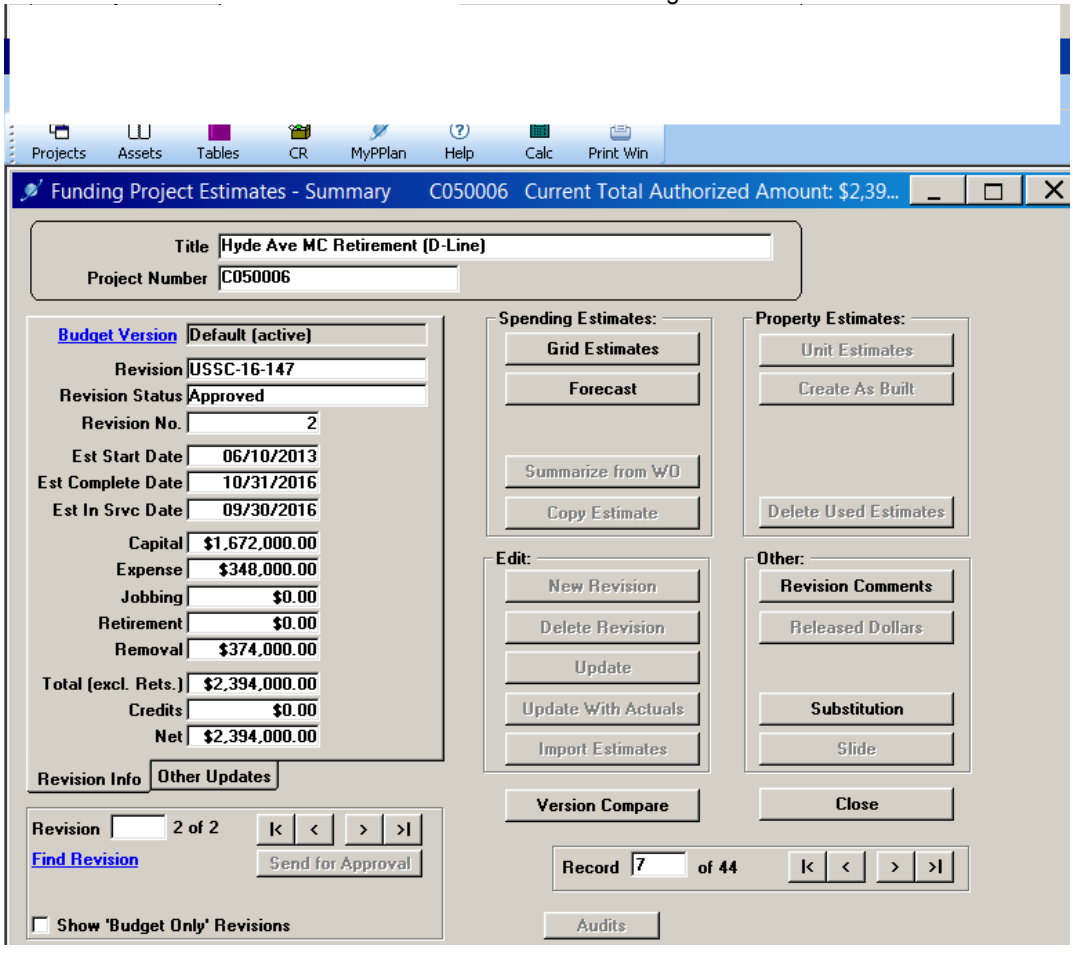
Related Projects:

Project Number:	Project Name:

Approvals

Line 1:	**Date**	3/24/2016 19:57:01	**Approver**	carlim	USSC Approver
Line 2:	**Date**		**Approver**		
Line 3:	**Date**		**Approver**		
Line 4:	**Date**		**Approver**		
Line 5:	**Date**		**Approver**		

*****Project Authorization is for Approved Revision Total Estimated Cost +10% *****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Funding Project Estimates - Summary
C050006 Current Total Authorized Amount: $2,39...
Title
Hyde Ave MC Retirement (D-Line)
Project Number
C050006
Budget Version
Default (active)
Revision
USSC-16-147
Revision Status
Approved
Revision No.
2
Est Start Date
06/10/2013
Est Complete Date
10/31/2016
Est In Srvc Date
09/30/2016
Capital
$1,672,000.00
Expense
$348,000.00
Jobbing
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Retirement
$0.00
Removal
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Total (excl. Rets.)
$2,394,000.00
Credits
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Net
$2,394,000.00
Revision Info
Other Updates
Revision
2 of 2
Find Revision
Send for Approval
Show 'Budget Only' Revisions
Spending Estimates:
Grid Estimates
Forecast
Summarize from WO
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Property Estimates:
Unit Estimates
Create As Built
Delete Used Estimates
Edit:
New Revision
Delete Revision
Update
Update With Actuals
Import Estimates
Other:
Revision Comments
Released Dollars
Substitution
Slide
Version Compare
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of 44
Audits

Resanction Request

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Title:	Hyde Avenue MC Retirement	**Sanction Paper #:**	USSC-16-147
Project #:	C050006, C051271	**Sanction Type:**	Resanction
Operating Company:	The Narragansett Electric Co.	**Date of Request:**	March 22, 2016
Author:	Jack P. Vaz	**Sponsor:**	John Gavin, VP Electric Asset Management
Utility Service:	Electricity T&D	**Project Manager:**	Joe Curley

1 *Executive Summary*

This paper requests the re-sanction of projects **C050006 and C051271** in the amount **2.544M** with a tolerance of +/- 10% for the purposes of Engineering, Procurement and full construction of the project.

This sanction amount is $2.544M broken down into:
$1.672M Capex
$0.348M Opex
$0.524M Removal

Note the originally requested sanction amount of $0.860M

2 *Re-sanction Details*

2.1 Project Summary

Hyde Avenue substation is a 13.8/4.16kV station with a single 5.25 MVA transformer supplying two feeders. It was built in 1959 and supplies distribution load in the City of Pawtucket. It serves approximately 1,745 customers with 2.90MW of load. This station is one of eleven 13.8/4.16kV substations in the Pawtucket area. These stations are primarily single metal-clad switchgear modules supplied by a single LTC transformer. They are all supplied from 13.8kV distribution circuits.

It is difficult to take stations of this type out of service for routine maintenance due to the single transformer nature of the design. The loads on the 4.16kV distribution stations are backed up through the use of feeder ties from adjacent stations. The existing feeder tie capacity is not always sufficient to offload a station to facilitate maintenance. In addition, there is no metering in these stations to accurately determine feeder or station loading making operating these stations even more difficult.

The 1950's vintage metal-clad switchgear at Hyde Avenue substation has been identified for replacement in accordance with the Metal-clad Switchgear Strategy. The bus insulation in this switchgear is prone to failure, the gaskets are at the end-of-life and

there are signs of moisture ingress and rust on the flooring. The flooring is warped making it difficult to rack the breakers in and out. The low side of the transformer is connected via enclosed bus, known as throat connected, and this is difficult to spare in case of an inadvertent failure.

The recommended plan to address the concerns at Hyde Avenue is to retire the station. The station load will be supplied from the existing area 13.8kV distribution system through conversions and the use of pole mounted step-down transformers. This is the most economical approach for this area and in-line with the long term plan for this area to continue to expand the 13.8kV distribution system.

2.2 Summary of Projects

Project Number	Project Type (Elec only)	Project Title	Estimate Amount ($M)
C050006	D-Line	Hyde Ave MC Retirement (D-Line)	2.394
C051271	D-Sub	Hyde Ave MC Retirement (D-Sub)	0.150
		Total	2.544

2.3 Prior Sanctioning History

Date	Governance Body	Sanctioned Amount	Paper Title	Sanction Type	Paper Reference Number	Tolerance
06/13/13	Power Plant	$0.860M	Hyde Ave MC Retirement	Full	N/A	±10%

Over / Under Expenditure Analysis

Summary Analysis ($M)	Capex	Opex	Removal	Total
Re-sanction Amount	1.672	0.348	0.524	2.544
Latest Approval	0.580	0.060	0.220	0.860
Change*	1.092	0.288	0.304	1.684

Change = (Re-sanction – Amount Latest Approval)

Resanction Request

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2.4 Cost Summary Table

Project Number	Project Title	Project Estimate Level (%)	Spend	Prior Yrs	Current Planning Horizon ($M) FY17 2016/17	FY18 2017/18	FY19 2018/19	Total
C050006	Hyde Ave MC Retirement (D-Line)	+/- 10%	CapEx	1.141	0.531	-	-	1.672
			OpEx	0.285	0.063	-	-	0.348
			Removal	0.343	0.031	-	-	0.374
			Total	1.769	0.625	-	-	2.394
C051271	Hyde Ave MC Retirement (D-Sub)	+/- 10%	CapEx	-	-	-	-	-
			OpEx	-	-	-	-	-
			Removal	-	0.150	-	-	0.150
			Total	-	0.150	-	-	0.150
Total Project Sanction			CapEx	1.141	0.531	-	-	1.672
			OpEx	0.285	0.063	-	-	0.348
			Removal	0.343	0.181	-	-	0.524
			Total	1.769	0.775	-	-	2.544

2.5 Business Plan

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
FY17-21 NE Distribution Budget	◉ Yes ○ No	◉ Over ○ Under ○ N/A	$0.316M

2.6 Drivers

The primary driver of the cost increase was the asset condition of the existing 4kV assets. Removing the pole mounted step-down transformers from the project scope and adding conversion work was recommended by Operations and agreed to by Engineering to realize crew mobilization and outage coordination efficiencies. Without this coordination, it is expected the asset work would have been progressed in five to ten years requiring a repeated mobilization.

Field inspections identified small wire in some of the 4.16kV circuits. Company construction standards recommend upgrading all wire smaller than #3 CU during a conversion. In addition, many more poles had to be replaced than originally anticipated due to their poor condition and because pole height did not provide adequate clearances with the conversion to the 13.8kV system.

2.6.1 Detailed Analysis Table

The following table indicates the major key variations that account for the difference between the original sanction amount and the requested re-sanction amount.

Detail Analysis (M's)	Over/Under Expenditure?	Amount
Step-Down Removals	☒ Over ☐ Under	$1.080M
Small Wire	☒ Over ☐ Under	$0.208M
Pole Plant	☒ Over ☐ Under	$0.396M

2.6.2 Explanation of Key Variations

The original scope document recommended the use of step-down transformers to reduce the cost of the conversion. During final design a decision was made to remove these step-down transformers and to convert the entire area because of the poor condition of the pole plant.

The Company's Geographical Information System (GIS) was used to develop the initial scope and cost estimate. During final design small wire was discovered on some of the 4kV circuits. This wire was upgraded consistent with company construction standards.

The initial estimate assumed generic construction costs for typical conversions. This area of the City of Pawtucket had a large population of pole plant in poor condition which needed to be upgraded as part of the conversion. It was the poor condition of this pole plant that also contributed to the decision to remove the proposed step-down transformers.

2.7 If cost > approved Business Plan how will this be funded?

Re-allocation of funds within the portfolio will be managed by Resource Planning to meet jurisdictional budgetary, statutory, and regulatory requirements.

2.8 Key Milestones

Milestone	Target Date: (Month/Year)
Project Re-sanction	Mar 2016
Construction Complete	Jul 2016
Closure Paper	Sep 2016
Project Close Out	Oct 2016

2.9 Next Planned Sanction Review

Date (Month/Year)	Purpose of Sanction Review
Sept 2016	Closure

3 *Statements of Support*

3.1 Supporters

The supporters listed have aligned their part of the business to support the project.

Department	Individual	Responsibilities
Investment Planning	Glen DiConza	Endorses relative to distribution 5-year plan or emergent work
Resource Planning	Anne Wyman	Endorses Resources, cost estimate, schedule, and Portfolio Alignment
Distribution Asset Management	Alan LaBarre	Endorses scope, design, conformance with design standards

3.2 Reviewers

The reviewers have provided feedback on the content/language of the paper

Function	Individual
Finance	Fowler, Keith
Regulatory	Zschokke, Peter
Jurisdictional Delegates	Patterson, Jim
Procurement	Curran, Art
Control Center	Gallagher, Mike

Resanction Request

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4 *Decisions*

I:

(a) APPROVE this paper and the investment of **$2.544M** and a tolerance of +/- 10%

(b) NOTE that **Joe Curley** is the Project Manager and has the approved financial delegation.

Signature.....Date.....3/24

Marie Jordan, Senior Vice President – Electric Process & Engineering

Resanction Request

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5 *Appendices*

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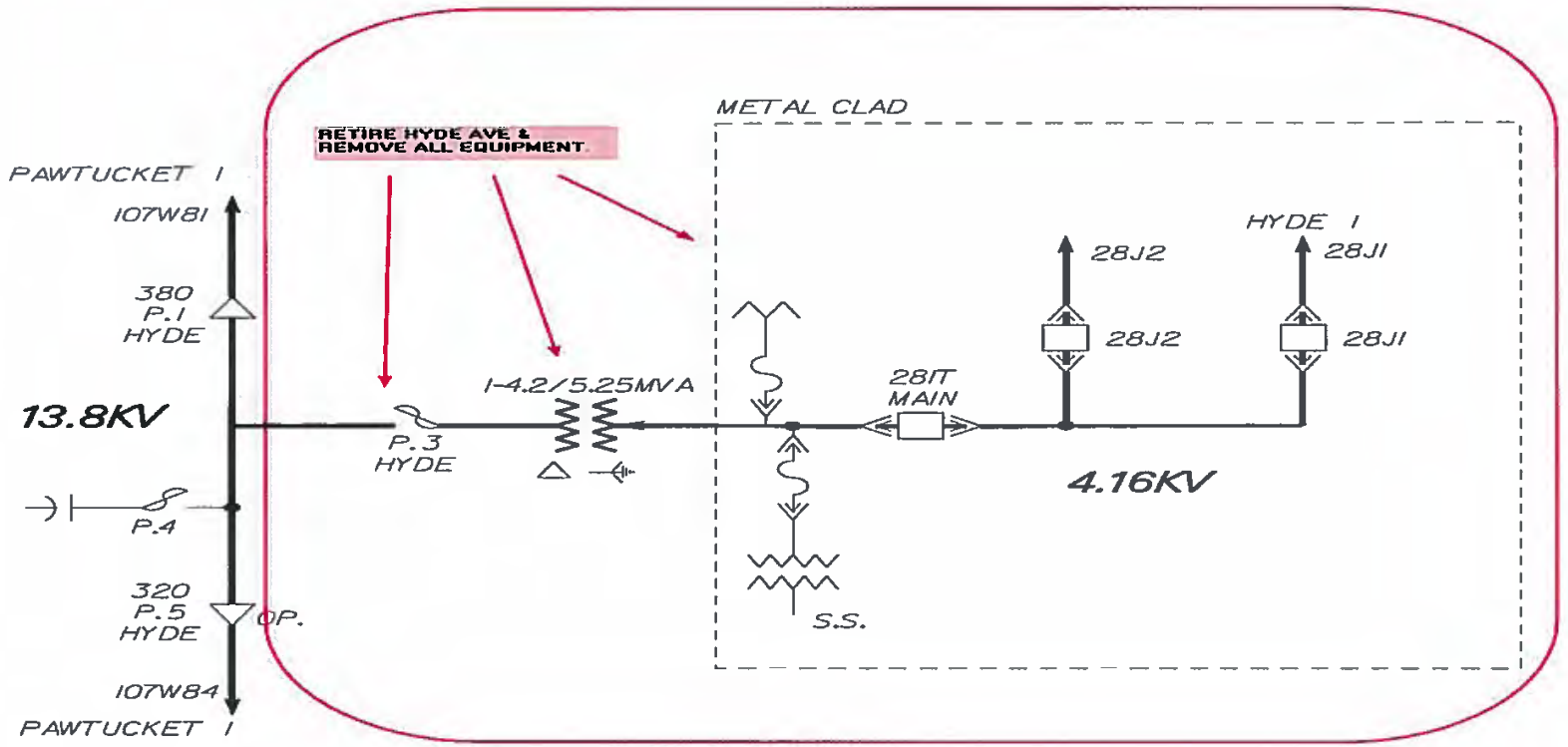
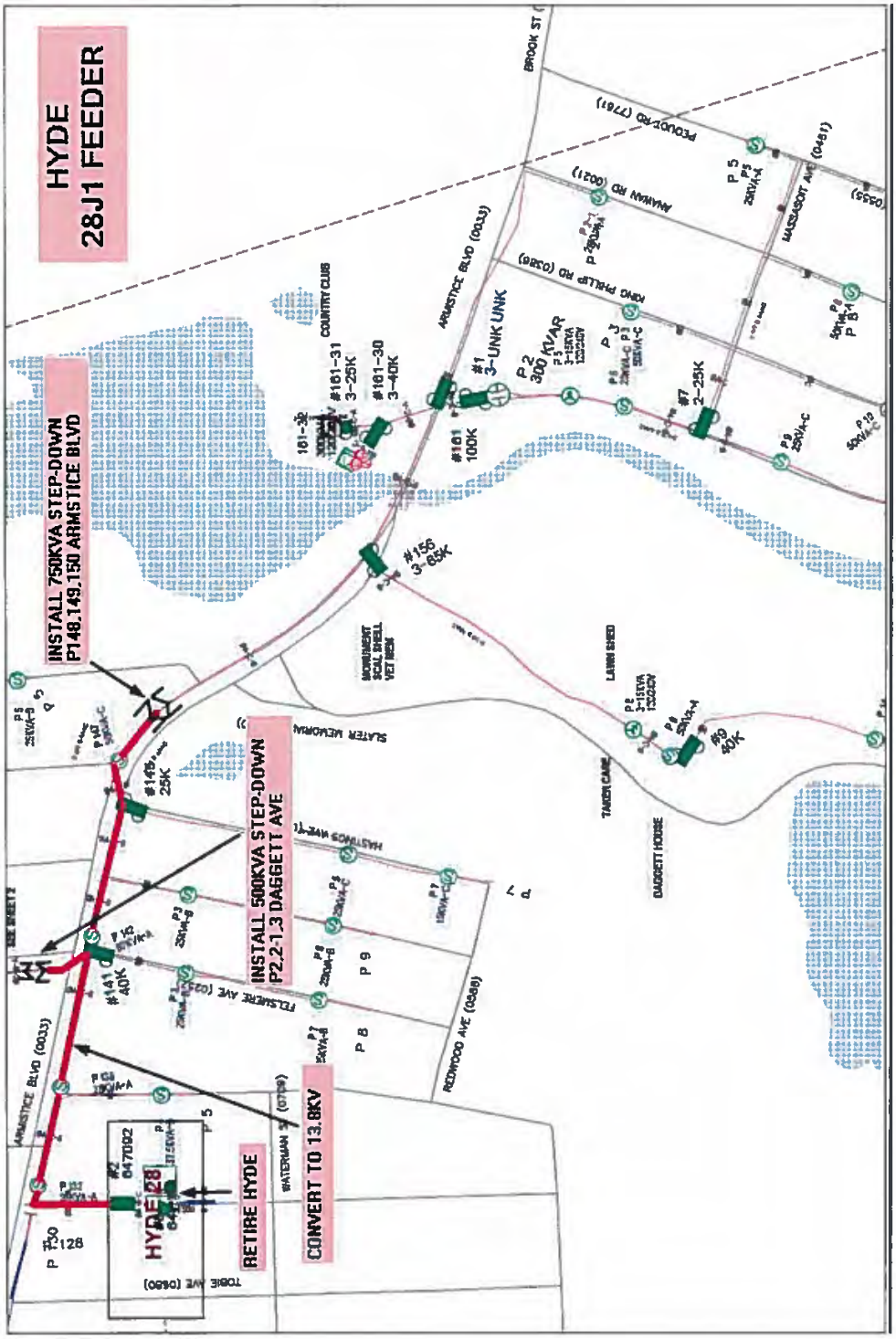


HYDE AVE SUBSTATION ONE-LINE



HYDE AVE 28J1 FEEDER CONVERSION

Page 9 of 10

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Resanction Request

Hyde Ave Metal Clad Retirement Sanction
Uncontrolled When Printed

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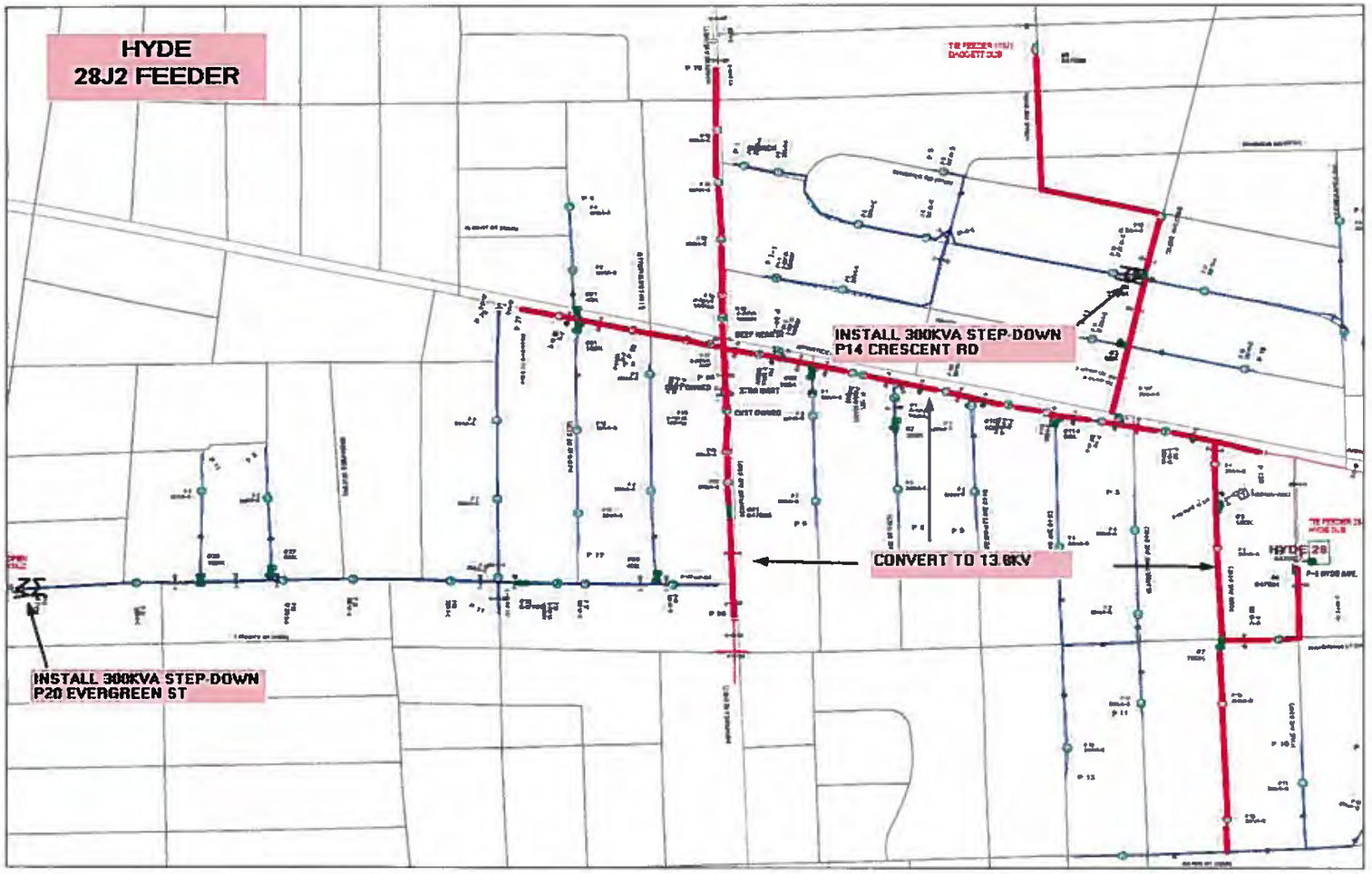


HYDE AVE 28J2 FEEDER CONVERSION

C050017

Daggett Ave MC Retirement (D-Line)

5360-Narragansett Electric and Gas
Project Revision Detail Report

Fund Project Number:	C050017	**USSC #:**	USSC-16-148 v2
Revision:	3	**Budget Version:**	
Project Title:	Daggett Ave MC Retirement (D-Line)		
Project Description:	Retire Daggett Ave substation and supply its load from the existing area 13.8kV distribution system.		

Project Status:	open		
Responsible Person:	MORAN, HEATHER	**Initiator:**	Vaz, Jack P
Spending Rationale:	Asset Condition	**Funding Type:**	P Electric Distribution Line RI
Budget Class:	Asset Replacement		
Capital by Category:			
Program Code:			
Project Risk Score:	39	**Project Complexity Score:**	11

Project Schedule / Expenditures

Revision Status:	Approved		
Est Start Date:	6/11/2013	**Est Complete Date:**	2/28/2018
Est In-Service Date:	11/30/2017		
TTD Actuals:	$2,627,291	**As Of:**	10/3/2017

Cost Breakdown	Capital	Expense	Removal	Total	Credits
	$1,807,000	$345,000	$298,000	$2,450,000	$0

Justification / Risk Identification:

Daggett Ave is a 13.8/4.16kV substation with a single 3.1 MVA transformer supplying two feeders. It serves approximately 1,300 customers with 2.60MW of load in the City of Pawtucket. This station is one of eleven 13.8/4.16kV substations in the Pawtucket area. These stations are primarily single metal-clad switchgear modules supplied by a single LTC transformer.

It is challenging to take these stations out of service for routine maintenance due to the inherent design of the stations

Project Scope:

Retire the Substation: This project recommends retirement of this substation and supplying its load from the existing area 13.8kV distribution system. A mixture of conversions to the existing 13.8kV system and the use of pole mounted 13.8/4.16kV step-down transformers will be utilized to reduce costs. The Conceptual Estimate of this plan is $0.93M.

Project Alternatives Considered:

Replace the Metal-Clad Switchgear: The Alternate Plan recommends replacing the existing metal-clad switchgear at the station with new in-kind metal-clad switchgear. New ductline and feeder getaway cables would be installed from the new switchgear to each riser pole. Each feeder would be cutover from the existing switchgear to the new switchgear. The Conceptual Estimate of this plan is $2.00M.

Additional Notes:

Retirement of substation is recommended for implementation. It is more economical over the alternate plan; Plan is in-line with the long-term plan for this area to reduce the 4.16kV distribution and to utilize the existing 13.8kV distribution; Plan retires assets that are no longer reliable.

Related Projects:

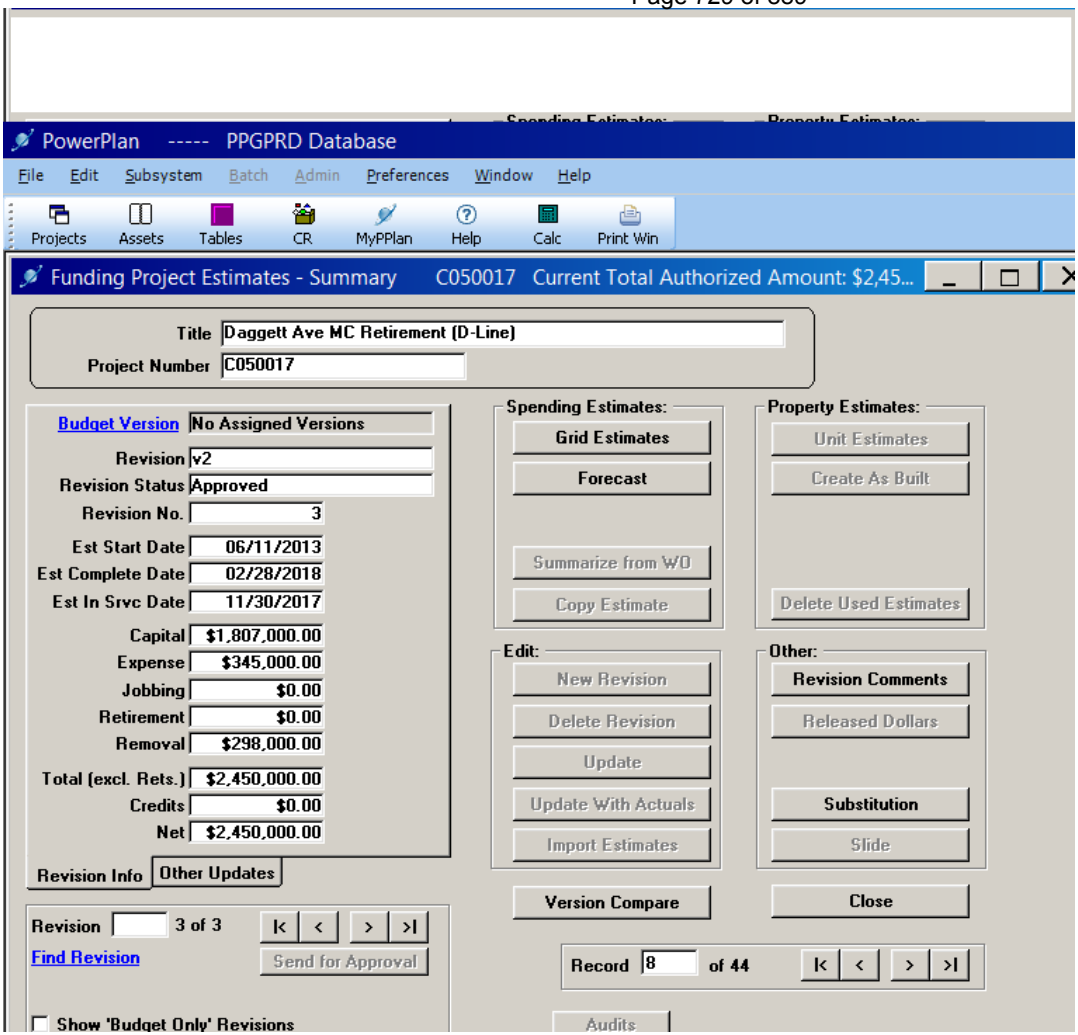
Project Number:	Project Name:

Approvals

Line 1:	**Date**	6/8/2017 09:28:47	**Approver**	monted	USSC Approver
Line 2:	**Date**		**Approver**		
Line 3:	**Date**		**Approver**		
Line 4:	**Date**		**Approver**		
Line 5:	**Date**		**Approver**		

*****Project Authorization is for Approved Revision Total Estimated Cost +10% *****

REDACTED - CEII Information has been Redacted



Resanction Request

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Title:	Daggett Ave Metal Clad Retirement	**Sanction Paper #:**	USSC-16-148v2
Project #:	C050017, C051274	**Sanction Type:**	Resanction
Operating Company:	The Narragansett Electric Co.	**Date of Request:**	5/30/17
Author:	Heather Moran	**Sponsor:**	Carol Sedewitz, Vice President, Electric Asset Management
Utility Service:	Electricity T&D	**Project Manager:**	Heather Moran

1 *Executive Summary*

This paper requests the resanction of C050017 and C051274 in the amount $3.150M with a tolerance of +/-10% for the purposes of final construction and project close out.

This sanction amount is $3.150M broken down into:

$1.807M Capex
$0.345M Opex
$0.998M Removal

Note the originally requested sanction amount of $2.185M.

2 *Resanction Details*

2.1 Project Summary

Daggett Avenue substation is a 13.8/4.16kV station with a single 3.1 MVA transformer supplying two feeders. It was built in 1950's and supplies distribution load in the City of Pawtucket. It serves approximately 1,300 customers with 2.60MW of load. This station is one of eleven 13.8/4.16kV substations in the Pawtucket area. These stations are primarily single metal-clad switchgear modules supplied by a single LTC transformer. They are all supplied from 13.8kV distribution circuits.

The 1950's vintage metal-clad switchgear at Daggett Avenue substation has been identified for replacement in accordance with the Metal-clad Switchgear Strategy. The bus insulation in this switchgear is prone to failure, the gaskets are at the end-of-life and there are signs of moisture ingress and rust on the flooring. The flooring is warped making it difficult to rack the breakers in and out. The low side of the transformer is connected via enclosed bus, known as throat connected, and this is difficult to spare in case of an inadvertent failure.

Resanction Request

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The recommended plan to address the concerns at Daggett Avenue is to retire the station. The station load will be supplied from the existing area 13.8kV distribution system through conversions and the use of pole mounted step-down transformers. The scope of work consists of converting a portion of the 113J1 feeder to the 107W61, then supplying the rest of the load from the Lee St Sub, 30J3 circuit, also converting the 113J2 circuit to the 107W61 feeder. This work consisted of reconductoring roughly 5800 feet of mainline and side tap conductor and upgrading associated transformers and equipment for the new 13.8kV feeder.

2.2 Summary of Projects

Project Number	Project Type (Elect only)	Project Title	Estimate Amount ($M)
C051274	D-Sub	Daggett Ave Metal Clad Retirement (Dsub)	0.105
C050017	D-Line	Daggett Ave Metal Clad Retirement (Dline)	2.450
		Total	2.555

2.3 Prior Sanctioning History

Previously approved sanctions are attached and listed below (Newest to Oldest).

Date	Governance Body	Sanctioned Amount	Potential Project Investment	Paper Title	Sanction Type	Paper Reference Number	Tolerance
3/22/16	USSC <$8M	$2.185M	$2.185M	Daggett Ave MC Retirement	Re - sanction	USSC-16-148	+/-10%
6/13/13	PowerPlant DOA <$1M	$0.935M	$0.935M	N/A	Sanction	N/A	+/-10%

Over / Under Expenditure Analysis

Summary Analysis ($M)	Capex	Opex	Removal	Total
Resanction Amount	1.807	0.345	0.403	3.150
Latest Approval	1.791	0.193	0.201	2.185
Change*	0.016	0.152	0.202	0.370

Change = (Re-sanction – Amount Latest Approval)

Resanction Request

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2.4 Cost Summary Table

Project Number	Project Title	Project Estimate Level (%)	Spend ($M)	Prior Yrs	Current Planning Horizon Yr. 1 2017/18	Yr. 2 2018/19	Yr. 3 2019/20	Yr. 4 2020/21	Yr. 5 2021/22	Yr. 6 + 2022/23	Total
C051274	Daggett Ave Metal Clad Retirement (Dsub)	+/- 10%	CapEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			OpEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Removal	0.000	0.105	0.000	0.000	0.000	0.000	0.000	0.105
			Total	0.000	0.105	0.000	0.000	0.000	0.000	0.000	0.105
C050017	Daggett Ave Metal Clad Retirement (Dline)	+/- 10%	CapEx	1.775	0.032	0.000	0.000	0.000	0.000	0.000	1.807
			OpEx	0.342	0.003	0.000	0.000	0.000	0.000	0.000	0.345
			Removal	0.297	0.001	0.000	0.000	0.000	0.000	0.000	0.298
			Total	2.414	0.036	0.000	0.000	0.000	0.000	0.000	2.450
Total Project Sanction			CapEx	1.775	0.032	0.000	0.000	0.000	0.000	0.000	1.807
			OpEx	0.342	0.003	0.000	0.000	0.000	0.000	0.000	0.345
			Removal	0.297	0.106	0.000	0.000	0.000	0.000	0.000	0.403
			Total	2.414	0.141	0.000	0.000	0.000	0.000	0.000	2.555

2.5 Business Plan

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
FY18-22 NE Distribution Budget	⊙ Yes ○ No	⊙ Over ○ Under ○ N/A	$0.041M

2.6 Drivers

2.6.1 Detailed Analysis Table

The following table indicates the major key variations that account for the difference between the original sanction amount and the requested resanction amount.

Detail Analysis	Over/Under Expenditure?	Amount (M's)
Labor	☒ Over ☐ Under	0.370M

2.6.2 Explanation of Key Variations

In order to deliver the retirement of the circuit in time for the target end of the FY17 fiscal year, more crews were added to the project based on availability. Also, due to the large area that was to be converted, several conversion outages were needed and all were performed on nights and weekends to accommodate the customer base in each area resulting in higher costs than estimated.

2.7 If cost > approved Business Plan how will this be funded?

Re-allocation of funds within the portfolio has been managed by Resource Planning to meet jurisdictional budgetary, statutory, and regulatory requirements.

2.8 Key Milestones

Milestone	Target Date: (Month/Year)
Construction Start	February 2016
Project Resanction	March 2016
Project Resanction	May 2017
Construction Complete	November 2017
Closure Paper	February 2018

2.9 Next Planned Sanction Review

Date (Month/Year)	Purpose of Sanction Review
February 2018	Closure Paper

3 *Statements of Support*

3.1 Supporters

The supporters listed have aligned their part of the business to support the project.

Department	Individual	Responsibilities
Investment Planning	Glen DiConza	Endorses relative to distribution 5-year plan or emergent work
Resource Planning	Anne Wyman/ Mark Phillips	Endorses Resources, cost estimate, schedule, and Portfolio Alignment
Distribution Asset Management	Alan LaBarre	Endorses scope, design, conformance with design standards

3.2 Reviewers

The reviewers have provided feedback on the content/language of the paper

Function	Individual
Finance	Collison, Mark
Regulatory	Zschokke, Peter
Jurisdictional Delegates	Anand, Sonny
Procurement	Curran, Art
Control Center	Gallagher, Mike

Resanction Request

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4 *Decisions*

I:

(a) APPROVE this paper and the investment of $3.150M and a tolerance of +/-10%

(b) NOTE that Heather Moran is the Project Manager and has the approved financial delegation.

Signature.....Date.....6/6/17.....

Executive Sponsor – Christopher Kelly,
Senior Vice President, Electric Process and Engineering

C050699

Hopkins Hill #63 - EMS Expansion

5360-Narragansett Electric and Gas
Project Revision Detail Report

Fund Project Number: C050699 **USSC #:**

Revision: 5 **Budget Version:** Default

Project Title: Hopkins Hill #63 - EMS Expansion

Project Description: This is part of the RTU program to install or expand an RTU at the Hopkins Hill #64 substation in order to gain status and control of the existing assets at the substation.

Project Status: Closed

Responsible Person: ALEXANDER, THOM/ **Initiator:** Duarte, Eileen M

Spending Rationale: System Capacity & Performance **Funding Type:** P Electric Distribution Sub RI

Budget Class: Reliability

Capital by Category:

Program Code:

Project Risk Score: 34 **Project Complexity Score:** 12

Project Schedule / Expenditures

Revision Status: Approved

Est Start Date: 7/16/2013 **Est Complete Date:** 10/28/2016

Est In-Service Date: 10/28/2016

TTD Actuals: $619,280 **As Of:** 10/3/2017

Cost Breakdown	Capital	Expense	Removal	Total	Credits
	$704,756	$2,750	$10,704	$718,210	$0

Justification / Risk Identification:

A Remote Terminal Unit (RTU) is a device used to transfer operational information from a substation to an Energy Management System (EMS) in a control center. This allows for remote operation and management of the system.

Currently, 71% of the substations in Rhode Island have RTU¿s installed. The total number of locations that may require an RTU is 33, and the number of locations that may require expansion of the existing RTU is 82. The long term goal of the strategy is to provide remote monitoring and control at all National Grid Substations.

Project Scope:

Expand the existing remote terminal unit (RTU) and associated wiring to provide status, control, and monitoring to the 13 kV system, specifically Feeders 63F1, 63F2 and 63F4, via our Energy Management System (EMS). Presently, there is (1) RTU in existence at Hopkins Hill #63 substation, (12) circuit breakers and (2) transformers.

Alarms should include transformer trouble, relay trouble, breaker trouble and transformer low oil. The monitoring should include voltage and current A, B, C, neutral, MW, MVA, MVAR. Control will include trip/close on switching

Project Alternatives Considered:

<Enter data here>

Additional Notes:

Re-Sanction from $414,569 to $718,210 document attached.Revised estimate is higher than original DOA by approximately $303k. Revised estimate is a "project grade estimate" that is based on a more stringent review of scope and resources and includes input from in-house construction, whereas the original planning estimate was based on generic labor units for a similar scope.
Sanction from $20K to $414,569 from Tom Alexander. Revised estimate is higher than original DOA by approximately

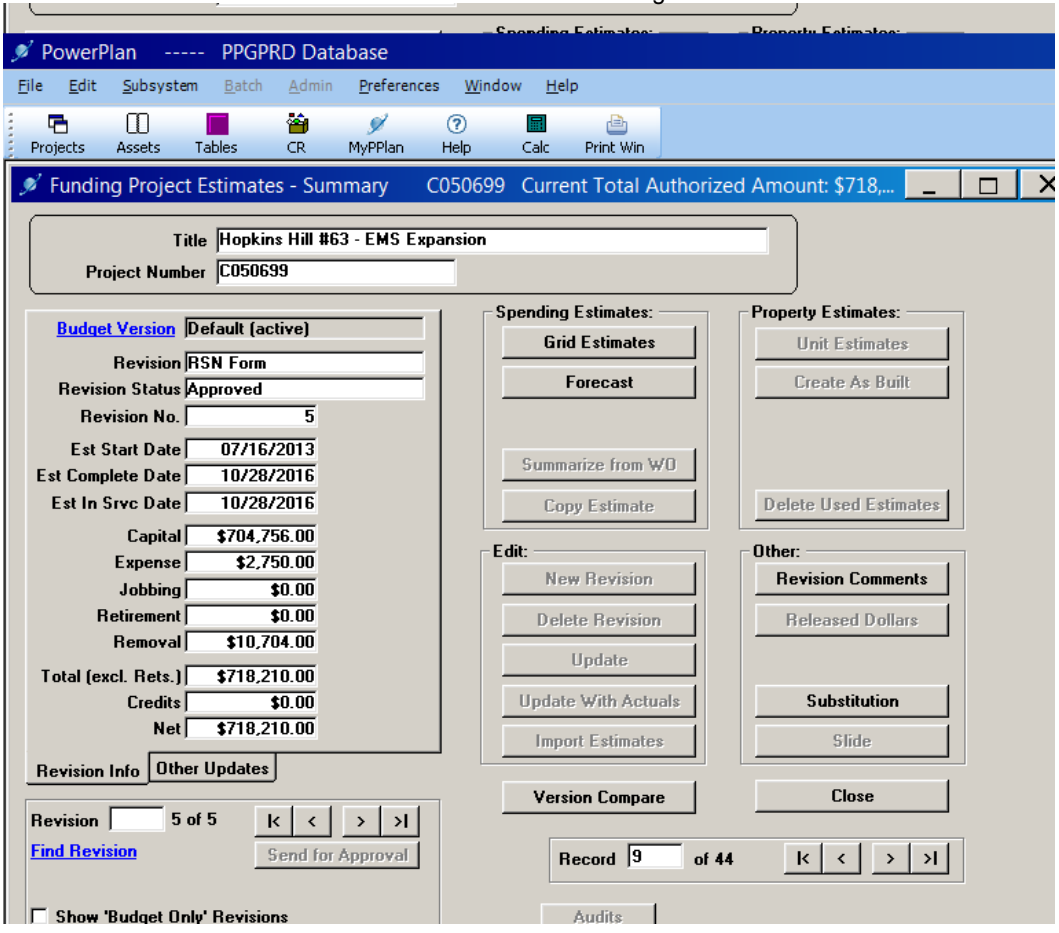
Related Projects:

Project Number: **Project Name:**

Approvals

Line 1:	**Date**	11/17/2015 16:41:18	**Approver**	nearyal	DOA - Distribution Lev
Line 2:	**Date**	11/20/2015 10:09:46	**Approver**	Diconza, Glen L	DOA - Distribution Lev
Line 3:	**Date**	11/23/2015 11:03:55	**Approver**	Martuscello, Suzan E	DOA - Distribution Lev
Line 4:	**Date**	12/3/2015 18:12:31	**Approver**	Constable, Ryan	DOA - Distribution Lev
Line 5:	**Date**	12/15/2015 09:10:26	**Approver**	LaBarre, Alan T	DOA - Distribution Lev

*****Project Authorization is for Approved Revision Total Estimated Cost +10%*****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Projects Assets Tables CR MyPPlan Help Calc Print Win
Funding Project Estimates - Summary C050699 Current Total Authorized Amount: $718,...
Title Hopkins Hill #63 - EMS Expansion
Project Number C050699
Budget Version Default (active)
Revision RSN Form
Revision Status Approved
Revision No. 5
Est Start Date 07/16/2013
Est Complete Date 10/28/2016
Est In Srvc Date 10/28/2016
Capital $704,756.00
Expense $2,750.00
Jobbing $0.00
Retirement $0.00
Removal $10,704.00
Total (excl. Rets.) $718,210.00
Credits $0.00
Net $718,210.00
Revision Info
Other Updates
Revision 5 of 5
Find Revision
Send for Approval
Show 'Budget Only' Revisions
Spending Estimates:
Grid Estimates
Forecast
Summarize from WO
Copy Estimate
Property Estimates:
Unit Estimates
Create As Built
Delete Used Estimates
Edit:
New Revision
Delete Revision
Update
Update With Actuals
Import Estimates
Other:
Revision Comments
Released Dollars
Substitution
Slide
Version Compare
Close
Record 9 of 44
Audits

Change in DOA Request Form (Less than Million)

Version 9.0

Note: Fill data in the grey area and email form to **Mario Carlino** and the appropriate IP analyst.
Gas - Tracy Nguyen
Electric - Janice Flynn

*Date:	11/13/2015
*Operating Company:	The Narragansett Electric Co.
*PowerPlant Project Id:	C050699
*Project Name:	Hopkins Hill - EMS Expansion
*Project Engineer:	Mary Foster
*Project Manager:	Tom Alexander

Latest Project Estimate

*Date of Latest Sanction:	

Total	Capex	Opex	Removal
$414,569	$407,002		$7,567

Revised Project Estimate

Total	Capex	Opex	Removal
$718,210	$704,756	$2,750	$10,704

Cash Flows

Previous FY	Capex	Opex	Removal
$124,000	$123,000		$1,000

Current FY	Capex	Opex	Removal
$86,796	$85,092		$1,704

FY+1	Capex	Opex	Removal
$507,414	$496,664	$2,750	$8,000

FY+2	Capex	Opex	Removal
$0			

Customer Contribution

Reason for Revision

☑	Revised forecast either exceeds or is lower than the Approved Amount - Project Still In Process
	New Project Estimated Completion Date: 10/28/2016
☐	Actual Spending either exceeds or is lower than the Approved Amount – Project is Complete

Reason for Increased Spending (Please expand the row height if box doesn't fit)

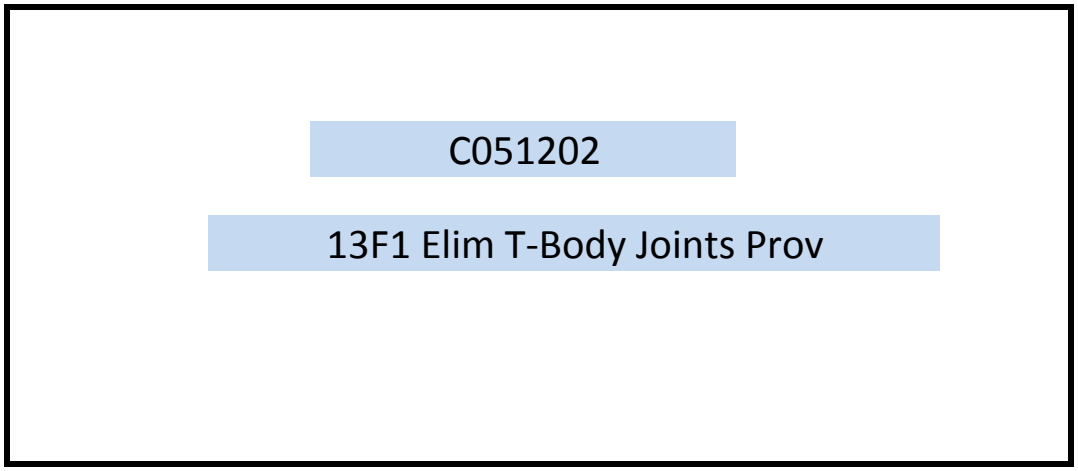
☐	**Change in Scope (Material, Labor or Other)**

Change in DOA Request Form (Less than Million)

☐	**Resource Allocation (Schedule, Delay, OT, or Contractor)**
☑	**Low / High Estimate**
	Revised estimate is higher than original DOA by approximately $303k. Revised estimate is a "project grade estimate" that is based on a more stringent review of scope and resources and includes input from in-house construction, whereas the original planning estimate was based on generic labor units for a similar scope.
☐	**External Forces (Permitting Requirements, Weather, Contractor Issues, etc)**

In-service Dates

*Original In-service Date:	8/28/2015
*Revised In-service Date:	8/4/2016


C051202
13F1 Elim T-Body Joints Prov

5360-Narragansett Electric and Gas
Project Revision Detail Report

Fund Project Number: C051202 **USSC #:**

Revision: 2 **Budget Version:** Default

Project Title: 13F1 Elim T-Body Joints Prov

Project Description: Eliminate T-body joints on Clarkson St 13F1 feeders in Providence (FY15)

Project Status: open

Responsible Person: MCGOVERN, SEAN **Initiator:** Livingston, Claire L

Spending Rationale: Asset Condition **Funding Type:** P Electric Distribution Line RI

Budget Class: Asset Replacement

Capital by Category:

Program Code:

Project Risk Score: 36 **Project Complexity Score:** 14

Project Schedule / Expenditures

Revision Status: Approved

Est Start Date: 8/13/2013 **Est Complete Date:** 3/31/2015

Est In-Service Date: 8/13/2013

TTD Actuals: $439,843 **As Of:** 10/3/2017

Cost Breakdown	Capital	Expense	Removal	Total	Credits
	$400,000	$0	$0	$400,000	$0

Justification / Risk Identification:

This project starts the elimination of T- bodies on all fdrs in the Capital District, Providence RI. This work is necessary for the long term stability of the underground system in this area. The project will reduce the potential for ad-hoc / emergency repairs. Performance history of the separable T-body splices installed in 1980's and 1990's indicates a higher failure rate than other types of splices used in our system. These troubled

Project Scope:

Replace T-body splices and cable sections as required on Clarkson 13F1 Fdr along Charles St, Canal St, Stillman St and Exchange St in Providence RI. Previous surveys indicate there are approximately 11 MH that have known T-bodies. The pending design should also consider the replacement of T-bodies on other capital fdrs as the opportunity presents, that is, fdrs in the same MH that are switched out for work on the 13F1 can also be replaced.

Known T-body splice locations on the Clarkson Street Sub 13F1 fdr are: Canal St MH2680, MH2666, Park ROW

Project Alternatives Considered:

<Enter data here>

Additional Notes:

8/13/13 JW est for budget purposes $ 500K FY15.

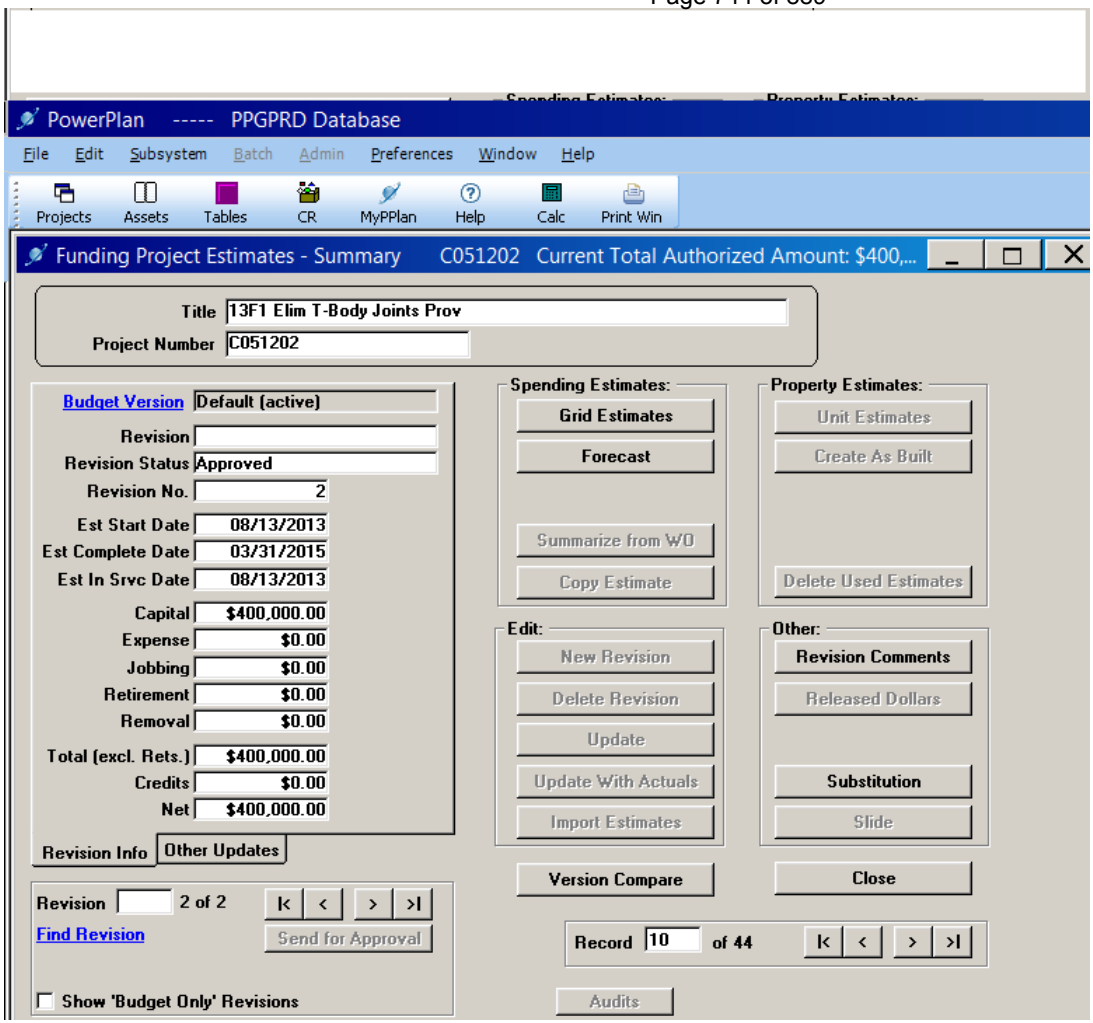
Related Projects:

Project Number: **Project Name:**

Approvals

Line 1:	**Date**	12/2/2013 12:49:19	**Approver**	labara	Approver 1
Line 2:	**Date**		**Approver**		
Line 3:	**Date**		**Approver**		
Line 4:	**Date**		**Approver**		
Line 5:	**Date**		**Approver**		

*****Project Authorization is for Approved Revision Total Estimated Cost +10% *****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Project Number C051202
Budget Version Default (active)
Revision
Revision Status Approved
Revision No. 2
Est Start Date 08/13/2013
Est Complete Date 03/31/2015
Est In Srvc Date 08/13/2013
Capital $400,000.00
Expense $0.00
Jobbing $0.00
Retirement $0.00
Removal $0.00
Total (excl. Rets.) $400,000.00
Credits $0.00
Net $400,000.00
Revision Info
Other Updates
Revision 2 of 2
Find Revision
Send for Approval
Show 'Budget Only' Revisions
Spending Estimates:
Grid Estimates
Forecast
Summarize from WO
Copy Estimate
Property Estimates:
Unit Estimates
Create As Built
Delete Used Estimates
Edit:
New Revision
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Update With Actuals
Import Estimates
Other:
Revision Comments
Released Dollars
Substitution
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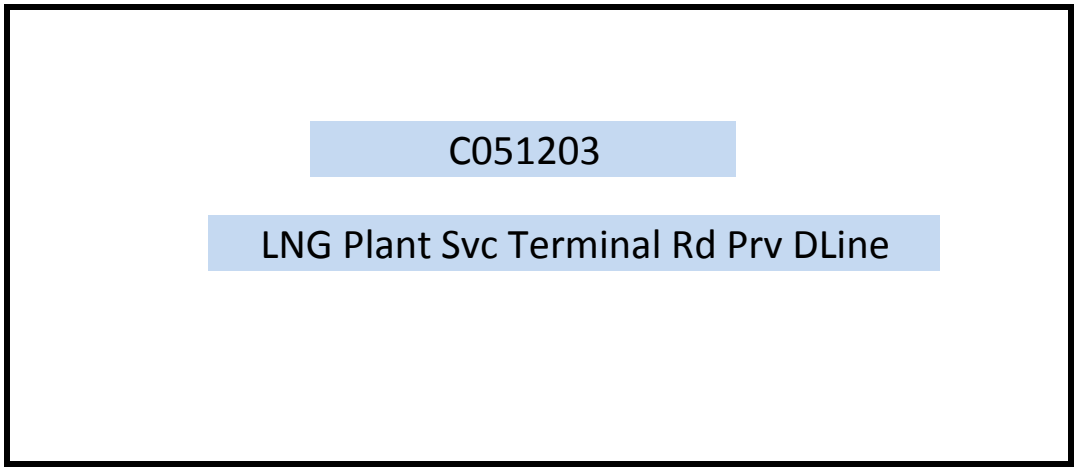
Audits


C051203
LNG Plant Svc Terminal Rd Prv DLine

5360-Narragansett Electric and Gas
Project Revision Detail Report

Fund Project Number:	C051203	**USSC #:**	USSC-15-199 v3
Revision:	5	**Budget Version:**	
Project Title:	LNG Plant Svc Terminal Rd Prv DLine		
Project Description:	D-Line construction - install 11 MW service to new LNG plant on Terminal Rd in Providence with in-service date 2017.		

Project Status:	open		
Responsible Person:	BURKE, JOHN C	**Initiator:**	Livingston, Claire L
Spending Rationale:	Customer Request/Public Require	**Funding Type:**	P Electric Distribution Line RI
Budget Class:	New Business - Commercial		
Capital by Category:			
Program Code:			
Project Risk Score:	49	**Project Complexity Score:**	21

Project Schedule / Expenditures

Revision Status:	Approved		
Est Start Date:	8/13/2013	**Est Complete Date:**	3/31/2018
Est In-Service Date:	10/31/2017		
TTD Actuals:	($454,370)	**As Of:**	10/4/2017

Cost Breakdown	Capital	Expense	Removal	Total	Credits
	$2,021,000	$201,000	$254,000	$2,476,000	$0

Justification / Risk Identification:

<Enter data here>

Project Scope:

<Enter data here>

Project Alternatives Considered:

<Enter data here>

Additional Notes:

8/13/13 CL est for budget purposes DLine $2M.

Related Projects:

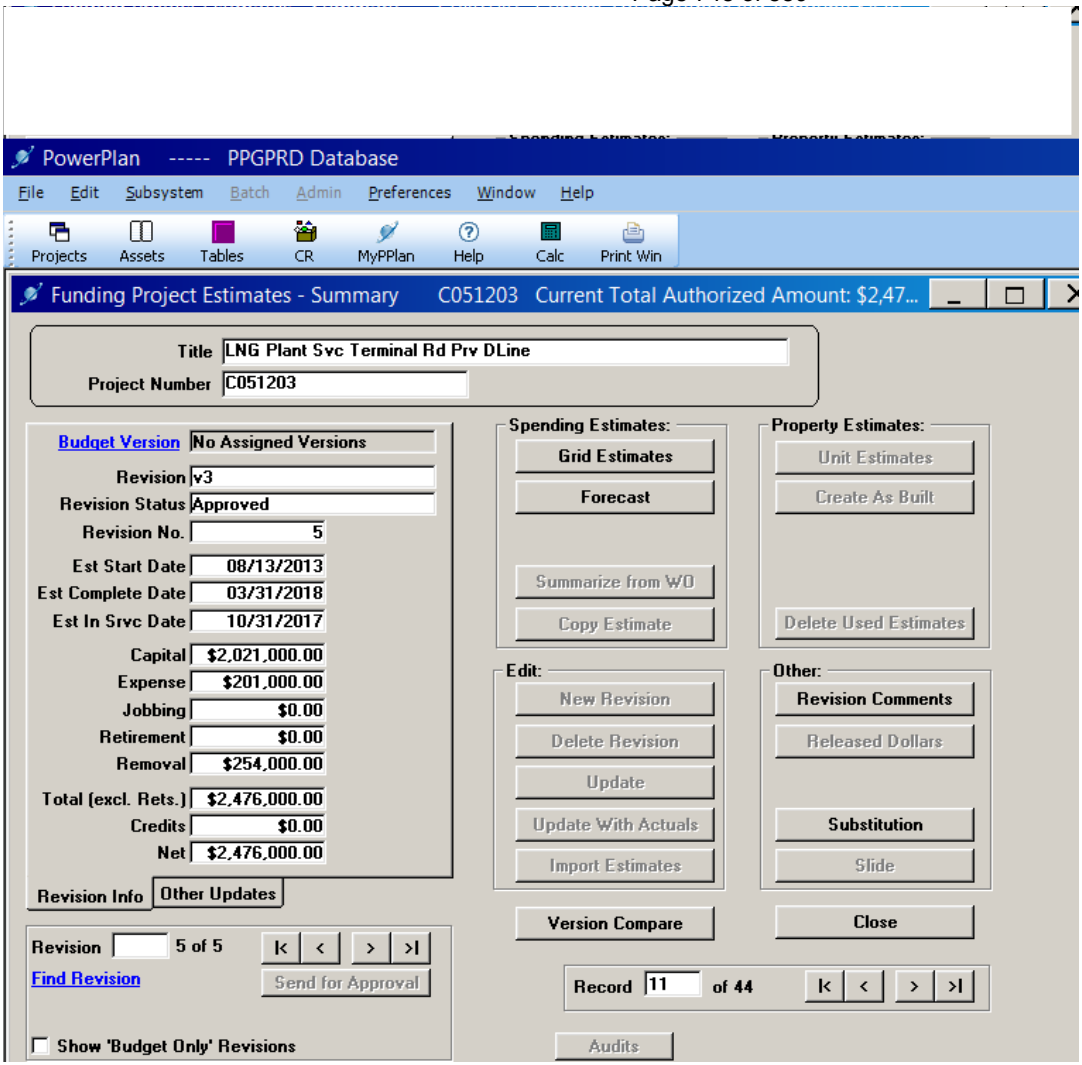
Project Number: **Project Name:**

Approvals

Line 1:	**Date**	2/1/2017 09:59:55	**Approver**	carlim	USSC Approver
Line 2:	**Date**		**Approver**		
Line 3:	**Date**		**Approver**		
Line 4:	**Date**		**Approver**		
Line 5:	**Date**		**Approver**		

*****Project Authorization is for Approved Revision Total Estimated Cost +10% *****

REDACTED - CEII Information has been Redacted



Short Form Sanction Paper

nationalgrid

Title:	Fields Point LNG-35 kV Electric Service	**Sanction Paper #:**	USSC-15-199 v3
Project #:	C051203, C051204	**Sanction Type:**	Sanction
Operating Company:	The Narragansett Electric Co.	**Date of Request:**	01/24/2017
Author:	John Burke	**Sponsor:**	Carol Sedewitz, Vice President Electric Asset Management
Utility Service:	Electricity T&D	**Project Manager:**	John Burke

1 Executive Summary

1.1 Sanctioning Summary

This paper requests sanction of project number C051203 and C051204 in the amount $5.589M with a tolerance of +/- 10% for the purposes full implementation for distribution substation and distribution line work.

This sanction amount is $5.589M broken down into:

$5.036M Capex
$0.201M Opex
$0.352M Removal
With a CIAC of $4.162M

1.2 Project Summary

National Grid's Fields Point liquefied natural gas storage facility (Fields Point LNG) is presently sourced by a single 11.5 kV distribution supply out of Franklin Square Substation in Providence, RI. Construction of a natural gas liquefaction facility at this location has prompted Fields Point LNG's request to upgrade their electric service to supply the proposed 13.0 MW of new load. The projects propose construction of new, and modification of existing, substation and distribution facilities to provide for the electric service upgrade. Specifically, to install an 11/34 kV step-up transformer at the existing Franklin Square Substation and extend 1.4 miles of 34.5 kV underground cable to a primary metered overhead service point at the Fields Point LNG.

Short Form Sanction Paper

nationalgrid

2 Project Detail

2.1 Background

Liquefied natural gas (LNG) has played an important role in providing a safe, reliable source of natural gas for National Grid's customers in New England. LNG is a critical part of National Grid's ability to provide safe and reliable natural gas to area homes and businesses.

Currently, LNG is brought into New England from overseas where unforeseen domestic or international events could make supply of gas less reliable. This makes it vitally important that National Grid have a domestic source for its New England customers. The proposed natural gas liquefaction facility at the Fields Point LNG would provide a safe, reliable, and cost effective way to supply natural gas to National Grid's customers.

National Grid is presently providing 11.5 kV primary metered service to the Fields Point LNG utilizing the 1123 feeder out of Franklin Square Substation. Peak loads for the proposed natural gas liquefaction facility are projected to be 13.0 MW. National Grid's existing 11.5 kV distribution service is not sufficient to supply the proposed load increase at the Fields Point LNG. Construction of new, and modification of existing, substation and distribution facilities are required to provide the Fields Point LNG with 34.5 kV service.

2.2 Drivers

The primary driver for this project is the proposed construction of a natural gas liquefaction facility at the Fields Point LNG. In support of construction activities, the customer has requested temporary electric service in the early summer of 2017 and for the 34.5kV service to be completed by early fall 2017 .Construction needs to commence by January 2017 in order to meet the proposed 34.5 kV electric service completion date of September 2017 and the overall completion of the new liquefaction plant.

2.3 Project Description

This project provides 34.5 kV primary metered electric service to the Fields Point LNG located at Terminal Road in Providence, RI. The scope of the required substation and distribution work includes installing an 11/34.5 kV step-up transformer at the existing Franklin Square Substation and extend 1.4 miles of 34.5 kV underground cable to a primary metered overhead service point at the Fields Point LNG. This is a new connection, mandatory service project.

2.4 Benefits

Construction of new, and modification of existing, substation and distribution facilities will establish a 34.5 kV primary metered supply to the proposed natural gas liquefaction facility at the Fields Point LNG.

2.5 Business & Customer Issues

The Fields Point LNG project will remove 3 miles of 23 kV underground cable that is on our asset replacement list. This project will also replace three existing GE Air Blast breakers at Franklin Square substation based upon asset performance and operability concerns. There are no additional significant business and customer issues beyond what has been described.

2.6 Alternatives

Alternative 1: Build a 115kV/34.5 kV Substation within the Franklin Square Yard and extend a 34.5 kV underground cable to the Fields Point LNG

The proposed supply would originate from the Franklin Square 115 kV yard and is stepped down to 34.5 kV through a 115/34.5 kV transformer. Distribution line infrastructure development is identical to that in the preferred plan. National Grid would extend 1.4 miles of 34.5 kV underground cable to a primary metered overhead service point at the Fields Point LNG. The estimated cost of this plan is $6.548M.

Alternative 1 is more expensive and contains additional construction complexities. This alternative would not likely be completed in time for the customer's September 2017 need date. This alternative would provide minor additional benefits over the preferred method. Therefore, it is not being selected.

Alternative 2: Leave as is

This is not a viable alternative given that summer 2017 peak loads at the Fields Point LNG, for the proposed natural gas liquefaction facility, are projected to be 13.0 MW. National Grid's existing 11.5 kV distribution service is not sufficient to supply the proposed load increases at the Fields Point LNG.

Short Form Sanction Paper

nationalgrid

2.7 Investment Recovery

2.7.1 Customer Impact

This project results in an indicative first full year revenue requirement when the asset is placed in service equal to approximately $0.892M. This is indicative only. The actual revenue requirement will differ, depending upon the timing of the next rate case and/or the timing of the next filing in which the project is included in rate base.

3 Related Projects, Scoring, Budgets

3.1 Summary of Projects

Project Number	Project Type (Elec only)	Project Title	Estimate Amount ($M)
C051203	D-Line	LNG Plant Svc Dline	2.476
C051204	D-Sub	LNG Plant Svc DSub	3.113
		Total	5.589

3.2 Associated Projects

N/A

3.3 Prior Sanctioning History

Date	Governance Body	Sanctioned Amount	Potential Project Investment	Paper Title	Sanction Type	Tolerance
09/29/2015	USSC	$1.200M	$3.616	Fields Point LNG-35 kV Electric Service	Partial Sanction	-50% / +200%
08/30/2016	USSC	$2.200M	$5.183M	Fields Point LNG-35 kV Electric Service	Partial Sanction	-50% / +200%

Short Form Sanction Paper

nationalgrid

3.4 Category

Category	Reference to Mandate, Policy, NPV, or Other
◉ Mandatory ○ Policy- Driven ○ Justified NPV ○ Other	Construction performed under specific projects C051203 and C051204 is being implemented to establish 34.5 kV primary metered electric service to Fields Point LNG. All costs, less any system improvement and applicable revenue credit, shall be borne by the customer. A CIAC shall be applied against these projects.

3.5 Asset Management Risk Score

Asset Management Risk Score: _49__

Primary Risk Score Driver: (Policy Driven Projects Only)

○ Reliability ○ Environment ○ Health & Safety ◉ Not Policy Driven

3.6 Complexity Level

○ High Complexity ◉ Medium Complexity ○ Low Complexity ○ N/A

Complexity Score: _21__

Short Form Sanction Paper

nationalgrid

3.7 Next Planned Sanction Review

Date (Month/Year)	Purpose of Sanction Review
March 2018	Project Closure

4 Financial

4.1 Business Plan

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
FY17-21 NE Distribution and Transmission Capital Plan	◉ Yes ○ No	◉ Over ○ Under ○ NA	$1.059M

4.1.1 If cost is not aligned with approved Business Plan how will this be funded?

Re-allocation of funds within the portfolio has been managed and approved by Resource Planning to meet jurisdictional budgetary, statutory and regulatory requirements. Of note this is a customer driven project and non-discretionary.

4.2 CIAC / Reimbursement

$M	Prior Yrs	Yr. 1 2016/17	Yr. 2 2017/18	Yr. 3 2018/19	Yr. 4 2019/20	Yr. 5 2020/21	Yr. 6 + 2021/22	Total
CIAC/Reimbursement	0.000	(4.162)	0.000	0.000	0.000	0.000	0.000	(4.162)

4.3 Cost Summary Table

Project Number	Project Title	Project Estimate Level (%)	Spend	Prior Yrs	Current Planning Horizon ($M) Yr. 1 2016/17	Yr. 2 2017/18	Yr. 3 2018/19	Yr. 4 2019/20	Yr. 5 2020/21	Yr. 6 + 2021/22	Total
C051203	LNG Plant Svc Dline	+/- 10%	CapEx	0.041	1.020	0.960	-	-	-	-	2.021
			OpEx	0.002	0.078	0.121	-	-	-	-	0.201
			Removal	0.252	0.002	-	-	-	-	-	0.254
			Total	0.295	1.100	1.081	-	-	-	-	2.476
C051204	LNG Plant Svc DSub	+/- 10%	CapEx	0.016	1.615	1.384	-	-	-	-	3.015
			OpEx	-	-	-	-	-	-	-	-
			Removal	-	0.044	0.054	-	-	-	-	0.098
			Total	0.016	1.659	1.438	-	-	-	-	3.113

4.4 Project Budget Summary Table

Project Costs Per Business Plan

		Current Planning Horizon ($M)						
$M	Prior Yrs (Actual)	Yr. 1 2016/17	Yr. 2 2017/18	Yr. 3 2018/19	Yr. 4 2019/20	Yr. 5 2020/21	Yr. 6 + 2021/22	Total
CapEx	0.057	0.697	3.082	0.144	0.000	0.000	0.000	3.980
OpEx	0.002	0.061	0.092	0.004	0.000	0.000	0.000	0.159
Removal	0.252	0.043	0.092	0.004	0.000	0.000	0.000	0.391
Total Cost in Bus. Plan	0.311	0.801	3.266	0.152	0.000	0.000	0.000	4.530

Variance (Business Plan-Project Estimate)

		Current Planning Horizon ($M)						
$M	Prior Yrs (Actual)	Yr. 1 2016/17	Yr. 2 2017/18	Yr. 3 2018/19	Yr. 4 2019/20	Yr. 5 2020/21	Yr. 6 + 2021/22	Total
CapEx	0.000	(1.938)	0.738	0.144	0.000	0.000	0.000	(1.056)
OpEx	0.000	(0.017)	(0.029)	0.004	0.000	0.000	0.000	(0.042)
Removal	0.000	(0.003)	0.038	0.004	0.000	0.000	0.000	0.039
Total Cost in Bus. Plan	0.000	(1.958)	0.747	0.152	0.000	0.000	0.000	(1.059)

5 Key Milestones

Milestone	Target Date: (Month/Year)
Project Sanction	January 2017
Construction Start	Feburary 2017
Ready for Load	September 2017
Construction Complete	October 2017
Project Closure	March 2018

6 Statements of Support

6.1.1 Supporters

The supporters listed have aligned their part of the business to support the project.

Role	Individual	Responsibilities
Investment Planning	DiConza, Glen	Endorses relative to 5-year business plan or emergent work
Resource Planning	Wyman, Anne & Phillips, Mark	Endorses construction resources, cost estimate, schedule, and portfolio alignment
Asset Management / Planning	Labarre, Alan	Endorses scope, estimate, and schedule with the company's goals, strategies, and objectives
Engineering and Design	Martuscello, Suzan	Endorses scope, design, conformance with design standards
Project Management	Schneller, Andrew	Endorses resources, cost estimate, schedule
Electric Project Estimation	Marceau, Daniel	Endorses Cost Estimate

6.1.2 Reviewers

The reviewers have provided feedback on the content/language of the paper.

Reviewer List	Individual
Finance	Easterly, Patricia
Regulatory	Zschokke, Peter
Jurisdictional Delegate	Patterson, Jim
Procurement	Curran, Art
Control Centers (CC)	Gallagher, Michael

6.1.3 List References

N/A

Short Form Sanction Paper

nationalgrid

7 Decisions

I:

(a) APPROVE this paper and the investment of $5.589M and a tolerance of +/-10%

(b) NOTE that John Burke is the Project Manager and has the approved financial delegation.

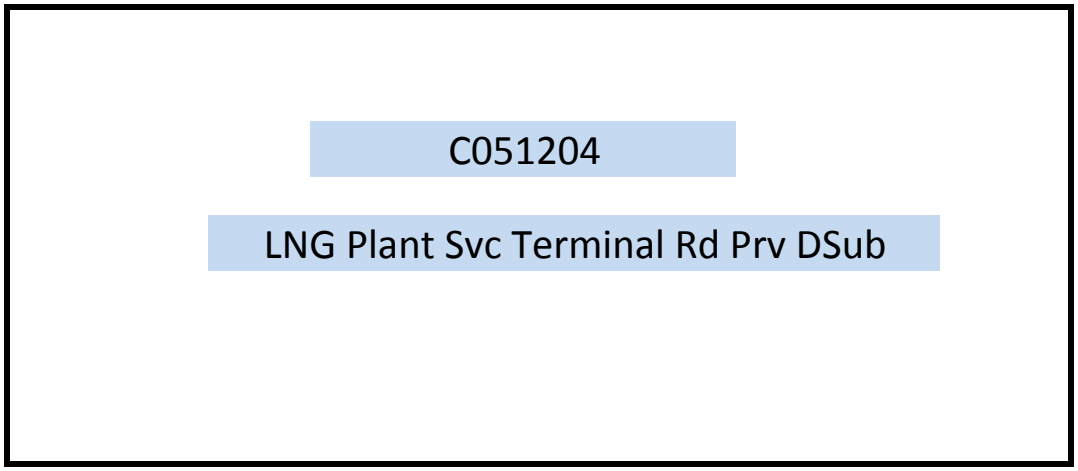
Signature.....Date...11/30/12...

Christopher Kelly – Acting Senior Vice President, Electric Process and Engineering

8 Other Appendices

8.1 Sanction Request Breakdown by Project

N/A


C051204
LNG Plant Svc Terminal Rd Prv DSub

5360-Narragansett Electric and Gas
Project Revision Detail Report

Fund Project Number:	C051204	**USSC #:**	USSC-15-199 v3
Revision:	5	**Budget Version:**	
Project Title:	LNG Plant Svc Terminal Rd Prv DSub		
Project Description:	D-Sub construction - install 11 MW service to new LNG plant on Terminal Rd in Providence with in-service date 2017.		

Project Status:	open		
Responsible Person:	BURKE, JOHN C	**Initiator:**	Livingston, Claire L
Spending Rationale:	Customer Request/Public Require	**Funding Type:**	P Electric Distribution Sub RI
Budget Class:	New Business - Commercial		
Capital by Category:			
Program Code:			
Project Risk Score:	49	**Project Complexity Score:**	21

Project Schedule / Expenditures

Revision Status:	Approved		
Est Start Date:	8/13/2013	**Est Complete Date:**	3/31/2018
Est In-Service Date:	10/31/2017		
TTD Actuals:	$2,347,172	**As Of:**	10/3/2017

Cost Breakdown	Capital	Expense	Removal	Total	Credits
	$3,015,000	$0	$98,000	$3,113,000	$0

Justification / Risk Identification:

<Enter data here>

Project Scope:

<Enter data here>

Project Alternatives Considered:

<Enter data here>

Additional Notes:

8/13/13 CL est for budget purposes DSub $3M.

Related Projects:

Project Number: **Project Name:**

Approvals

Line 1:	**Date**	2/1/2017 11:04:41	**Approver**	carlim	USSC Approver
Line 2:	**Date**		**Approver**		
Line 3:	**Date**		**Approver**		
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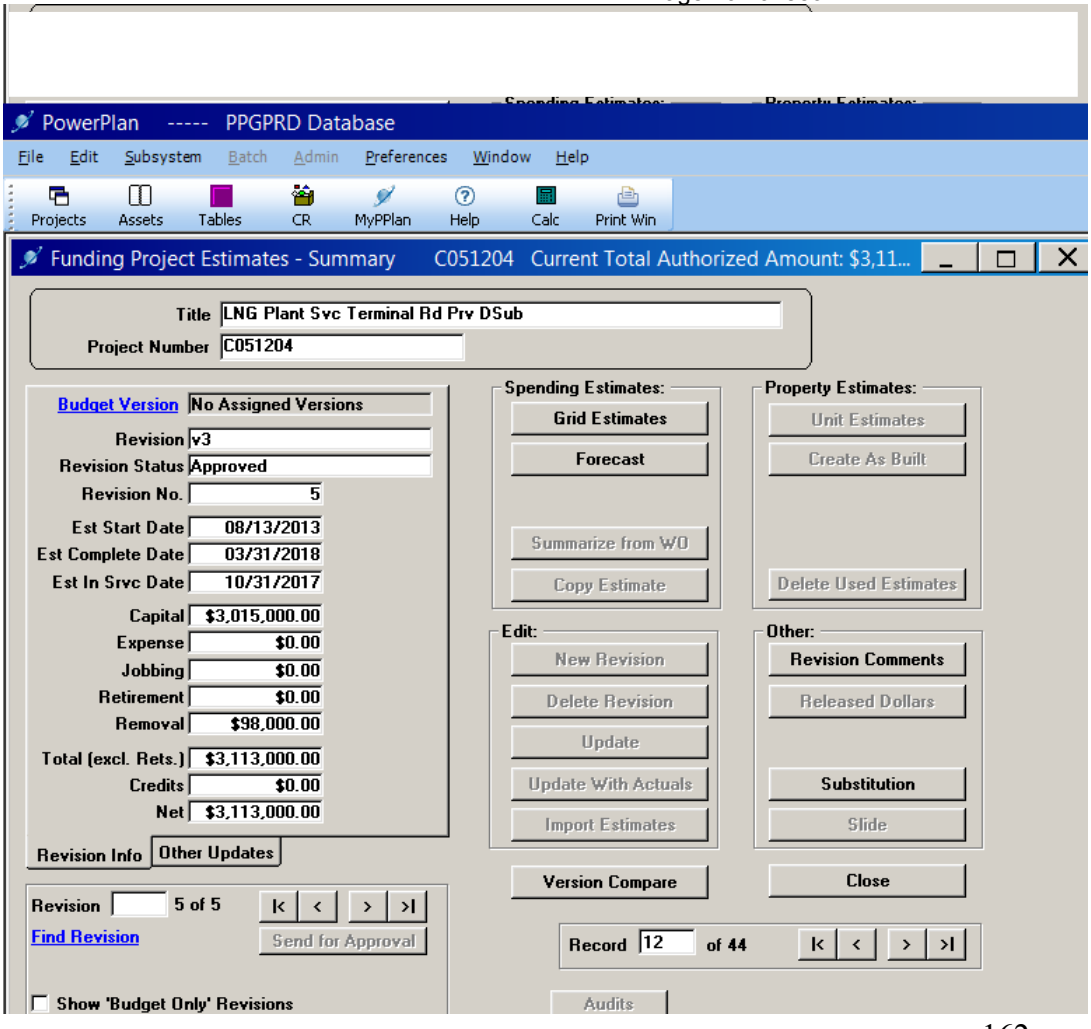
Line 5:	**Date**		**Approver**		

*****Project Authorization is for Approved Revision Total Estimated Cost +10% *****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Title LNG Plant Svc Terminal Rd Prv DSub
Project Number C051204
Budget Version No Assigned Versions
Revision v3
Revision Status Approved
Revision No. 5
Est Start Date 08/13/2013
Est Complete Date 03/31/2018
Est In Srvc Date 10/31/2017
Capital $3,015,000.00
Expense $0.00
Jobbing $0.00
Retirement $0.00
Removal $98,000.00
Total (excl. Rets.) $3,113,000.00
Credits $0.00
Net $3,113,000.00
Revision Info
Other Updates
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Find Revision
Send for Approval
Show 'Budget Only' Revisions
Spending Estimates:
Grid Estimates
Forecast
Summarize from WO
Copy Estimate
Property Estimates:
Unit Estimates
Create As Built
Delete Used Estimates
Edit:
New Revision
Delete Revision
Update
Update With Actuals
Import Estimates
Other:
Revision Comments
Released Dollars
Substitution
Slide
Version Compare
Close
Record 12 of 44
Audits

Short Form Sanction Paper

nationalgrid

Title:	Fields Point LNG-35 kV Electric Service	**Sanction Paper #:**	USSC-15-199 v3
Project #:	C051203, C051204	**Sanction Type:**	Sanction
Operating Company:	The Narragansett Electric Co.	**Date of Request:**	01/24/2017
Author:	John Burke	**Sponsor:**	Carol Sedewitz, Vice President Electric Asset Management
Utility Service:	Electricity T&D	**Project Manager:**	John Burke

1 Executive Summary

1.1 Sanctioning Summary

This paper requests sanction of project number C051203 and C051204 in the amount $5.589M with a tolerance of +/- 10% for the purposes full implementation for distribution substation and distribution line work.

This sanction amount is $5.589M broken down into:

$5.036M Capex
$0.201M Opex
$0.352M Removal
With a CIAC of $4.162M

1.2 Project Summary

National Grid's Fields Point liquefied natural gas storage facility (Fields Point LNG) is presently sourced by a single 11.5 kV distribution supply out of Franklin Square Substation in Providence, RI. Construction of a natural gas liquefaction facility at this location has prompted Fields Point LNG's request to upgrade their electric service to supply the proposed 13.0 MW of new load. The projects propose construction of new, and modification of existing, substation and distribution facilities to provide for the electric service upgrade. Specifically, to install an 11/34 kV step-up transformer at the existing Franklin Square Substation and extend 1.4 miles of 34.5 kV underground cable to a primary metered overhead service point at the Fields Point LNG.

2 Project Detail

2.1 Background

Liquefied natural gas (LNG) has played an important role in providing a safe, reliable source of natural gas for National Grid's customers in New England. LNG is a critical part of National Grid's ability to provide safe and reliable natural gas to area homes and businesses.

Currently, LNG is brought into New England from overseas where unforeseen domestic or international events could make supply of gas less reliable. This makes it vitally important that National Grid have a domestic source for its New England customers. The proposed natural gas liquefaction facility at the Fields Point LNG would provide a safe, reliable, and cost effective way to supply natural gas to National Grid's customers.

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2.2 Drivers

The primary driver for this project is the proposed construction of a natural gas liquefaction facility at the Fields Point LNG. In support of construction activities, the customer has requested temporary electric service in the early summer of 2017 and for the 34.5kV service to be completed by early fall 2017 .Construction needs to commence by January 2017 in order to meet the proposed 34.5 kV electric service completion date of September 2017 and the overall completion of the new liquefaction plant.

2.3 Project Description

This project provides 34.5 kV primary metered electric service to the Fields Point LNG located at Terminal Road in Providence, RI. The scope of the required substation and distribution work includes installing an 11/34.5 kV step-up transformer at the existing Franklin Square Substation and extend 1.4 miles of 34.5 kV underground cable to a primary metered overhead service point at the Fields Point LNG. This is a new connection, mandatory service project.

2.4 Benefits

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2.5 Business & Customer Issues

The Fields Point LNG project will remove 3 miles of 23 kV underground cable that is on our asset replacement list. This project will also replace three existing GE Air Blast breakers at Franklin Square substation based upon asset performance and operability concerns. There are no additional significant business and customer issues beyond what has been described.

2.6 Alternatives

Alternative 1: Build a 115kV/34.5 kV Substation within the Franklin Square Yard and extend a 34.5 kV underground cable to the Fields Point LNG

The proposed supply would originate from the Franklin Square 115 kV yard and is stepped down to 34.5 kV through a 115/34.5 kV transformer. Distribution line infrastructure development is identical to that in the preferred plan. National Grid would extend 1.4 miles of 34.5 kV underground cable to a primary metered overhead service point at the Fields Point LNG. The estimated cost of this plan is $6.548M.

Alternative 1 is more expensive and contains additional construction complexities. This alternative would not likely be completed in time for the customer's September 2017 need date. This alternative would provide minor additional benefits over the preferred method. Therefore, it is not being selected.

Alternative 2: Leave as is

This is not a viable alternative given that summer 2017 peak loads at the Fields Point LNG, for the proposed natural gas liquefaction facility, are projected to be 13.0 MW. National Grid's existing 11.5 kV distribution service is not sufficient to supply the proposed load increases at the Fields Point LNG.

Short Form Sanction Paper

nationalgrid

2.7 Investment Recovery

2.7.1 Customer Impact

This project results in an indicative first full year revenue requirement when the asset is placed in service equal to approximately $0.892M. This is indicative only. The actual revenue requirement will differ, depending upon the timing of the next rate case and/or the timing of the next filing in which the project is included in rate base.

3 Related Projects, Scoring, Budgets

3.1 Summary of Projects

Project Number	Project Type (Elec only)	Project Title	Estimate Amount ($M)
C051203	D-Line	LNG Plant Svc Dline	2.476
C051204	D-Sub	LNG Plant Svc DSub	3.113
		Total	5.589

3.2 Associated Projects

N/A

3.3 Prior Sanctioning History

Date	Governance Body	Sanctioned Amount	Potential Project Investment	Paper Title	Sanction Type	Tolerance
09/29/2015	USSC	$1.200M	$3.616	Fields Point LNG-35 kV Electric Service	Partial Sanction	-50% / +200%
08/30/2016	USSC	$2.200M	$5.183M	Fields Point LNG-35 kV Electric Service	Partial Sanction	-50% / +200%

Short Form Sanction Paper

nationalgrid

3.4 Category

Category	Reference to Mandate, Policy, NPV, or Other
◉ Mandatory ○ Policy- Driven ○ Justified NPV ○ Other	Construction performed under specific projects C051203 and C051204 is being implemented to establish 34.5 kV primary metered electric service to Fields Point LNG. All costs, less any system improvement and applicable revenue credit, shall be borne by the customer. A CIAC shall be applied against these projects.

3.5 Asset Management Risk Score

Asset Management Risk Score: _49__

Primary Risk Score Driver: (Policy Driven Projects Only)

○ Reliability ○ Environment ○ Health & Safety ◉ Not Policy Driven

3.6 Complexity Level

○ High Complexity ◉ Medium Complexity ○ Low Complexity ○ N/A

Complexity Score: _21__

Short Form Sanction Paper

nationalgrid

3.7 Next Planned Sanction Review

Date (Month/Year)	Purpose of Sanction Review
March 2018	Project Closure

4 Financial

4.1 Business Plan

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
FY17-21 NE Distribution and Transmission Capital Plan	◉ Yes ○ No	◉ Over ○ Under ○ NA	$1.059M

4.1.1 If cost is not aligned with approved Business Plan how will this be funded?

Re-allocation of funds within the portfolio has been managed and approved by Resource Planning to meet jurisdictional budgetary, statutory and regulatory requirements. Of note this is a customer driven project and non-discretionary.

4.2 CIAC / Reimbursement

$M	Prior Yrs	Yr. 1 2016/17	Yr. 2 2017/18	Yr. 3 2018/19	Yr. 4 2019/20	Yr. 5 2020/21	Yr. 6 + 2021/22	Total
CIAC/Reimbursement	0.000	(4.162)	0.000	0.000	0.000	0.000	0.000	(4.162)

4.3 Cost Summary Table

Project Number	Project Title	Project Estimate Level (%)	Spend	Prior Yrs	Current Planning Horizon ($M) Yr. 1 2016/17	Yr. 2 2017/18	Yr. 3 2018/19	Yr. 4 2019/20	Yr. 5 2020/21	Yr. 6 + 2021/22	Total
C051203	LNG Plant Svc Dline	+/- 10%	CapEx	0.041	1.020	0.960	-	-	-	-	2.021
			OpEx	0.002	0.078	0.121	-	-	-	-	0.201
			Removal	0.252	0.002	-	-	-	-	-	0.254
			Total	0.295	1.100	1.081	-	-	-	-	2.476
C051204	LNG Plant Svc DSub	+/- 10%	CapEx	0.016	1.615	1.384	-	-	-	-	3.015
			OpEx	-	-	-	-	-	-	-	-
			Removal	-	0.044	0.054	-	-	-	-	0.098
			Total	0.016	1.659	1.438	-	-	-	-	3.113

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4.4 Project Budget Summary Table

Project Costs Per Business Plan

		Current Planning Horizon ($M)						
$M	Prior Yrs (Actual)	Yr. 1 2016/17	Yr. 2 2017/18	Yr. 3 2018/19	Yr. 4 2019/20	Yr. 5 2020/21	Yr. 6 + 2021/22	Total
CapEx	0.057	0.697	3.082	0.144	0.000	0.000	0.000	3.980
OpEx	0.002	0.061	0.092	0.004	0.000	0.000	0.000	0.159
Removal	0.252	0.043	0.092	0.004	0.000	0.000	0.000	0.391
Total Cost in Bus. Plan	0.311	0.801	3.266	0.152	0.000	0.000	0.000	4.530

Variance (Business Plan-Project Estimate)

		Current Planning Horizon ($M)						
$M	Prior Yrs (Actual)	Yr. 1 2016/17	Yr. 2 2017/18	Yr. 3 2018/19	Yr. 4 2019/20	Yr. 5 2020/21	Yr. 6 + 2021/22	Total
CapEx	0.000	(1.938)	0.738	0.144	0.000	0.000	0.000	(1.056)
OpEx	0.000	(0.017)	(0.029)	0.004	0.000	0.000	0.000	(0.042)
Removal	0.000	(0.003)	0.038	0.004	0.000	0.000	0.000	0.039
Total Cost in Bus. Plan	0.000	(1.958)	0.747	0.152	0.000	0.000	0.000	(1.059)

5 Key Milestones

Milestone	Target Date: (Month/Year)
Project Sanction	January 2017
Construction Start	Feburary 2017
Ready for Load	September 2017
Construction Complete	October 2017
Project Closure	March 2018

6 Statements of Support

6.1.1 Supporters

The supporters listed have aligned their part of the business to support the project.

Role	Individual	Responsibilities
Investment Planning	DiConza, Glen	Endorses relative to 5-year business plan or emergent work
Resource Planning	Wyman, Anne & Phillips, Mark	Endorses construction resources, cost estimate, schedule, and portfolio alignment
Asset Management / Planning	Labarre, Alan	Endorses scope, estimate, and schedule with the company's goals, strategies, and objectives
Engineering and Design	Martuscello, Suzan	Endorses scope, design, conformance with design standards
Project Management	Schneller, Andrew	Endorses resources, cost estimate, schedule
Electric Project Estimation	Marceau, Daniel	Endorses Cost Estimate

6.1.2 Reviewers

The reviewers have provided feedback on the content/language of the paper.

Reviewer List	Individual
Finance	Easterly, Patricia
Regulatory	Zschokke, Peter
Jurisdictional Delegate	Patterson, Jim
Procurement	Curran, Art
Control Centers (CC)	Gallagher, Michael

6.1.3 List References

N/A

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7 Decisions

I:

(a) APPROVE this paper and the investment of $5.589M and a tolerance of +/-10%

(b) NOTE that John Burke is the Project Manager and has the approved financial delegation.

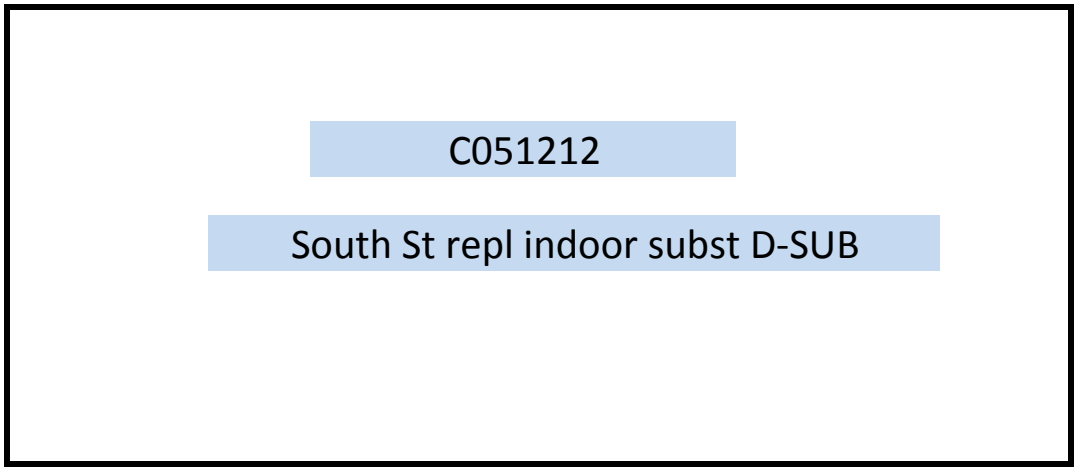
Signature.....Date...11/30/12...

Christopher Kelly – Acting Senior Vice President, Electric Process and Engineering

8 Other Appendices

8.1 Sanction Request Breakdown by Project

N/A


C051212
South St repl indoor subst D-SUB

5360-Narragansett Electric and Gas
Project Revision Detail Report

Fund Project Number:	C051212	**USSC #:**	USSC-14-195 v2
Revision:	3	**Budget Version:**	Default
Project Title:	South St repl indoor subst D-SUB		
Project Description:	Replace existing indoor substation at South Street in Providence - DSub work.		

Project Status:	open		
Responsible Person:	ANTUNES, NELSON	**Initiator:**	Livingston, Claire L
Spending Rationale:	Asset Condition	**Funding Type:**	P Electric Distribution Sub RI
Budget Class:	Asset Replacement		
Capital by Category:			
Program Code:			
Project Risk Score:	48	**Project Complexity Score:**	29

Project Schedule / Expenditures

Revision Status:	Approved		
Est Start Date:	8/13/2013	**Est Complete Date:**	3/31/2020
Est In-Service Date:	8/30/2019		
TTD Actuals:	$22,713,255	**As Of:**	10/4/2017

Cost Breakdown	Capital	Expense	Removal	Total	Credits
	$27,738,000	$10,000	$0	$27,748,000	$0

Justification / Risk Identification:

<Enter data here>

Project Scope:

<Enter data here>

Project Alternatives Considered:

<Enter data here>

Additional Notes:

8/13/13 CL - Rev1 estimate for budget purposes - FY15-18 splits per RConstable. Note - does not include any 23 kV construction that would be required by early construction due to Brown University.

Related Projects:

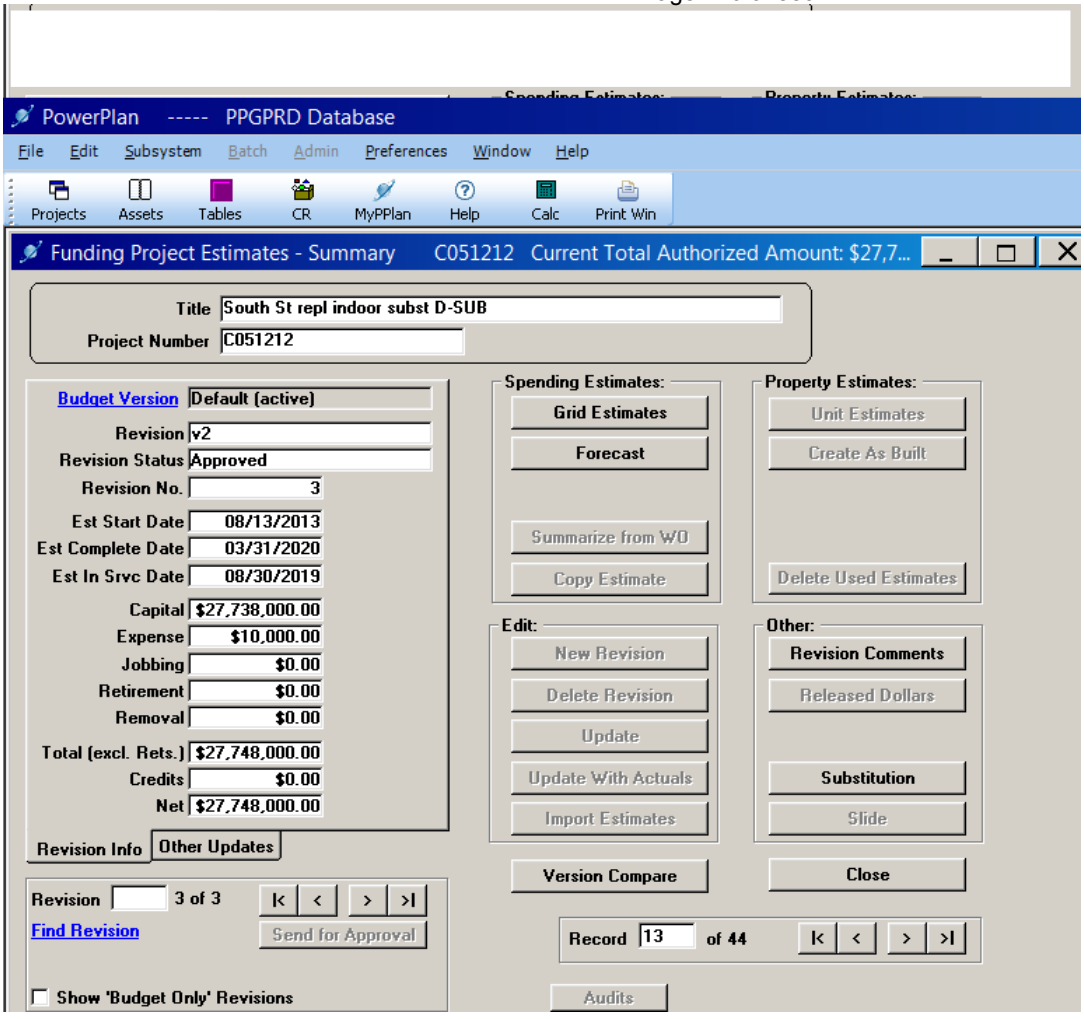
Project Number: **Project Name:**

Approvals

Line 1:	**Date**	8/5/2015 11:36:59	**Approver**	carlim	USSC Approver
Line 2:	**Date**		**Approver**		
Line 3:	**Date**		**Approver**		
Line 4:	**Date**		**Approver**		
Line 5:	**Date**		**Approver**		

*****Project Authorization is for Approved Revision Total Estimated Cost +10% *****

REDACTED - CEII Information has been Redacted



This document has been redacted for Critical Energy Infrastructure Information (CEII).

US Sanction Paper

Title:	South Street Substation Rebuild	**Sanction Paper #:**	USSC-14-195-V2
Project #:	C051212, C051213, C055584, C055585, C055586, C055623	**Sanction Type:**	Partial Sanction
Operating Company:	The Narragansett Electric Company	**Date of Request:**	6-10-15
Author:	Nelson M. Antunes / Bob Galgano / Ryan Constable	**Sponsor:**	John Gavin, VP Asset Management
Utility Service:	Electricity T&D	**Project Manager:**	Nelson M. Antunes

1 Executive Summary

1.1 Sanctioning Summary:

This paper requests partial sanction of C051212, C051213, C055584, C055585, C055586, and C055623 in the amount $74.500M with a tolerance of +/-10% for the purpose of Design Engineering, Permitting, Procurement of long lead equipment and Preliminary Construction.

The sanction amount is $74.500M broken down into:

$71.475M Capex
$0.025M Opex
$3.000M Removal

NOTE: The potential investment of $95.352M less a CIAC of $11.612M results in a net project cost of $83.740M with a tolerance of +/-25% contingent upon submittal and approval of a Project Sanction paper following completion of the scope above.

1.2 Brief Description:

These projects summarized in the document are described in the "Providence Area Long Term Distribution and Supply Study" ("Providence Study"), dated May 2014 and the "Providence Area Long Term Distribution and Supply Study Addendum" ("Study Addendum"), dated May 2014. The study noted the significant asset condition issues at the South Street Substation ("South St. Sub"), concluded the importance of this location, and the need to maintain an 11.5kV supply to the downtown network from this location. As a result of these findings, the study presented a recommended plan to rebuild the South St. Sub. The Study Addendum addresses certain substation design details and timing issues as a result of internal Substation Engineering and Operations consultation and recent, large scale customer driven development.

US Sanction Paper

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The project includes a new substation on the existing South Street substation site in the City of Providence, R.I. The new substation includes three 115-11 kV, 33/44/55 MVA LTC transformers and an indoor substation building with indoor metal clad switchgear with twenty-three positions for 11 kV circuits, four (4) position for the 23kV to 11kV transformers and three (3) cap banks. Additionally, the project include moving the three 115 kV transmission lines from overhead to underground for 0.3 miles long from Franklin Square to the new South Street substation. The existing South Street 115/11 kV station and existing overhead transmission lines will be removed.

1.3 Summary of Projects:

Project Number	Project Type (Elec only)	Project Title	Estimate Amount ($M)
C051212	D-Sub	South Street Substation Rebuild	41.895
C051213	D-Line	South Street Substation Rebuild	13.470
C055584	T-Sub	South Street Substation Rebuild	25.641
C055585	T-Line	South Street Substation Rebuild	7.899
C055586	T-Sub	South Street Substation Rebuild - Franklin Sub	3.000
C055623	T-Sub	South Street Substation Rebuild - Demolition	3.445
		Total	95.350

1.4 Associated Projects:

N/A

Project Number	Project Title	Estimate Amount
N/A	N/A	$ -
	Total	$ -

1.5 Prior Sanctioning History (including relevant approved Strategies):

N/A

Date	Governance Body	Sanctioned Amount	Potential Project Investment	Paper Title	Sanction Type	Tolerance
6/25/2014	USSC	$23.740M	$64.150M	South Street Substation Rebuild	Partial Sanction	+50%/-25%

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1.6 Next Planned Sanction Review:

Date (Month/Year)	Purpose of Sanction Review
June 2018	Project Sanction South Street Project
March 2020	Projected Closure Sanction Paper

1.7 Category:

Category	Reference to Mandate, Policy, or NPV Assumptions
○ Mandatory ◉ Policy- Driven ○ Justified NPV	National Grid USA EO Internal Strategy Document Distribution Planning Criteria Strategy

1.8 Asset Management Risk Score

Asset Management Risk Score: 48

Primary Risk Score Driver: (Policy Driven Projects Only)

◉ Reliability ○ Environment ○ Health & Safety ○ Not Policy Driven

1.9 Complexity Level: (if applicable)

◉ High Complexity ○ Medium Complexity ○ Low Complexity ○ N/A

Complexity Score: 29

1.10 Process Hazard Assessment

A Process Hazard Assessment (PHA) is required for this project:

◉ Yes ○ No

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1.11 Business Plan:

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
FY16-20 New England Distribution Spending Plan	◉ Yes ○ No	◉ Over ○ Under ○ NA	$33.494M
FY16-20 New England Transmission Spending Plan	◉ Yes ○ No	◉ Over ○ Under ○ NA	$13.865M

1.12 If cost > approved Business Plan how will this be funded?

Re-allocation of funds within the portfolio will be managed by Resource Planning to meet jurisdictional, budgetary, statutory and regulatory requirements.

1.13 Current Planning Horizon:

Current Planning Horizon – Total Project Cost:

		Current Planning Horizon						
		Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	Prior Yrs	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
CapEx	0.217	11.713	45.316	22.984	3.495	7.736	0.000	91.461
OpEx	0.000	0.000	0.006	0.006	0.006	0.007	0.000	0.025
Removal	0.017	0.012	0.017	0.017	0.234	3.567	0.000	3.864
CIAC/Reimbursement	0.000	(10.916)	0.000	0.000	(0.696)	0.000	0.000	(11.612)
Total	0.234	0.809	45.339	23.007	3.039	11.310	0.000	83.738

Current Planning Horizon – Distribution:

		Current Planning Horizon						
		Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	Prior Yrs	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
CapEx	0.062	7.114	20.099	20.623	2.428	5.019	0.000	55.345
OpEx	0.000	0.000	0.006	0.006	0.006	0.002	0.000	0.020
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CIAC/Reimbursement	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	0.062	7.114	20.105	20.629	2.434	5.021	0.000	55.365

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Current Planning Horizon - Transmission

		Current Planning Horizon						
		Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	Prior Yrs	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
CapEx	0.155	4.599	25.217	2.361	1.067	2.717	0.000	36.116
OpEx	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.005
Removal	0.017	0.012	0.017	0.017	0.234	3.567	0.000	3.864
CIAC/Reimbursement	0.000	(10.916)	0.000	0.000	(0.696)	0.000	0.000	(11.612)
Total	0.172	(6.305)	25.234	2.378	0.605	6.289	0.000	28.373

1.14 Key Milestones

Milestone	**Target Date: (Month/Year)**
Partial Sanction	June 2015
Permitting and Licensing Complete	December 2015
Complete Final Design	November 2016
Start of South Street Substation Construction (T,D & Sub)	February 2016
Ready for Load (In Phases)	November 2018
Complete Cutovers from Existing South Street to New Substation	April 2019
Existing Building Removal	July 2019
Construction Complete	August 2019
Project Closure Report	March 2020

1.15 Resources, Operations and Procurement:

Resource Sourcing			
Engineering & Design Resources to be provided	☑ Internal		☑ Contractor
Construction/Implementation Resources to be provided	☑ Internal		☑ Contractor
Resource Delivery			
Availability of internal resources to deliver project:	○ Red	○ Amber	◉ Green

Availability of external resources to deliver project:	○ Red	○ Amber	◉ Green
Operational Impact			
Outage impact on network system:	○ Red	○ Amber	◉ Green
Procurement Impact			
Procurement impact on network system:	○ Red	○ Amber	◉ Green

1.16 Key Issues (include mitigation of Red or Amber Resources):

1	Receipt of Permits (RIDEM, CRMC, EFSB, Zoning)
2	Timely customer payment of cost for undergrounding the 115 kV transmission line.
3	Development and execution of 11 kV circuit cutover plan.
4	Coordination with other ongoing construction in the immediate area of project

1.17 Climate Change:

Contribution to National Grid's 2050 80% emissions reduction target:	◉ Neutral	○ Positive	○ Negative
Impact on adaptability of network for future climate change:	◉ Neutral	○ Positive	○ Negative

1.18 List References:

1	Providence Area Long Term Distribution and Supply Study, May 2014
2	Providence Area Long Term Distribution and Supply Study Addendum, May 2014
3	Conceptual Engineering Report - New South Street Substation, May 2014
4	Asset Condition Report – South Street Substation, January 2011

US Sanction Paper

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2 Decisions

The US Sanctioning Committee (USSC) at a meeting held on June 10, 2015:

(a) APPROVED the investment of $74.500M and a tolerance of +/-10% for the purpose of Design Engineering, Permitting, Procurement of major Equipment and Preliminary Construction for the reasons stated above.

(b) NOTED the potential investment of $95.352M less a CIAC of $11.612M with a tolerance of +/-25%, contingent upon submittal and approval of a Project Sanction paper following completion of Design Engineering, Permit approvals, and the start of construction activities.

(c) NOTED that Nelson Antunes is the Project Manager and Sonny Anand has the approved financial delegation to undertake the activities stated in (a).

Signature.....Date.....6/29/15

Margaret Smyth
US Chief Financial Officer
Chair, US Sanctioning Committee

US Sanction Paper

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3 Sanction Paper Detail

Title:	South Street Substation	**Sanction Paper #:**	USSC-14-195-V2
Project #:	C051212, C051213, C055584, C055585, C055586, C055623	**Sanction Type:**	Partial Sanction
Operating Company:	The Narragansett Electric Company	**Date of Request:**	6-10-2015
Author:	Nelson M. Antunes / Bob Galgano / Ryan Constable	**Sponsor:**	John Gavin, VP Asset Management
Utility Service:	Electricity T&D	**Project Manager:**	Nelson M. Antunes

3.1 Background

South Street substation is a major 115/11 kV supply substation serving downtown Providence, RI and the surrounding area. In combination with the Franklin Square 115/11 kV substation, the two substations serve a combined peak load of approximately 148 MVA. The South Street and Franklin Square substations supply the Providence Downtown network, one 23 kV substation, one 11 kV substation, eight (8) 4 kV distribution substations, the Providence Hurricane Barrier, the main campus of Brown University, Women's and Infant's Hospital, RI Hospital, St. Joseph's Hospital, Roger Williams Hospital, the VA Hospital and local 11.5 kV distribution customers.

Figures 4.2.1 through 4.2.3 and Figures 4.2.4 through 4.2.6 show one line electric diagrams and site pictures respectively of the South St Sub and surrounding facilities. Figures 4.2.4 through 4.2.6 show pictures of the existing South St Substation.

The Providence Area Long Term Supply and Distribution Study provide a high-level conceptual plan for the future development of the supply and distribution system in the City of Providence and adjacent communities. This study has identified the need for construction of a new 115/11 kV substation to replace the existing South Street substation as a result of asset condition issues described in Section 3.2.

In the Fall of 2013, National Grid was approached by a developer proposing a large scale project in the immediate area of the South Street Substation. As currently envisioned by the developer, the former South Street Power Station ("Dynamo House") and the adjacent Davol Square property would be used to construct a state-of-the-art nursing education center for Rhode Island College and the University of Rhode Island, and administrative office space for Brown University.[1] This redevelopment plan

[1] Societal benefit represented informally by the Davol Square developer as job creation on the order or approximately 1,500 construction jobs and 540 permanent jobs with potential economic growth of $29 million in annual earnings and $64 million in statewide economic output.

included three potential factors that could impact the Providence Study recommendations:

- The relocation of the existing South St. Sub (away from the Dynamo House);
- The rebuild of the existing transmission taps to South St. Sub in an underground configuration;
- The lease or transfer of a portion of the South St. Sub parcel for construction of a parking garage.

As described above, the rebuild or relocation of the South St. Sub on the existing site but away from the Dynamo House was recommended by the Providence Study. Although not recommended in the Providence Study, rebuilding the South Street Substation 115kV taps in an underground configuration was estimated. This estimate and scope was communicated to the developer as requiring a customer contribution. While contribution discussions are still ongoing, the full cost of this factor is presented in Section 3.10.3 as a Contribution In Aid of Construction ("CIAC"). A Conceptual Engineering review was conducted in the Fall/Winter of 2013 to determine the feasibility of leasing a portion of the station property for a parking garage. This effort concluded the parking garage was feasible. Additional details regarding these factors are described in the Study Addendum, however in summary:

- The relocation/rebuild of the existing South St. Sub was the potential recommendation of the draft Providence Study at the time of the Davol Square developer's request.
- The rebuild of the existing transmission taps to South St. Sub in an underground configuration is not recommended, but can be completed at the customer's cost.
- The lease or transfer of a portion of the South St. Sub parcel for construction of a parking garage is technically feasible.

3.2 Drivers

South Street Substation replacement is driven by asset condition concerns. These concerns are described in the Asset Condition Report for the South Street Substation which is summarized in the Providence Area Long Term Distribution and Supply Study.

The Asset Condition Report for the South Street substation describes issues and recommends the replacement of a variety of station components. The building layout is such that it precludes the implementation of modern installation standards in order to replace original equipment. Additionally, spare parts for the protection components are unavailable and will be irreplaceable in the event of a failure. Lastly, maintenance work is time consuming and because of previously stated issues results in custom site-specific repairs.

Specific asset condition issues exist for the transformers, breakers, switches, feeder reactors, and the battery system. Transformer concerns include past bushing failures, top cover leaks, and partial internal discharge primarily associated with the #2216 11.5kV to 23kV unit. A number of 11.5kV breakers have reduced fault interrupting performance due to their outdated design. Also, replacement bushings, mechanisms and live parts for these breakers are no longer commercially available. Certain 11.5kV gang operated switches have operational issues. In some of the bays these switches are mounted in such a manner that replacement requires both the #1 and #2 11.5 kV buses to be taken out of service. The existing reactors are the limiting elements for some feeders and cannot be replaced with similar or larger units. Lastly, the battery system is approximately 18 years old and planned for replacement.

3.3 Project Description

The proposed project consists of constructing a new South Street substation on the existing South Street site, transferring all 11 kV circuits to the new substation, and removing the existing 115-11 kV substation.

The 115 kV supply to the new substation will be via three new 115 kV underground cables. The cables will terminate at new structures at the Franklin Square substation, and be routed along two diverse routes to the new South Street substation. One route, for two cable circuits, will be on National Grid owned land along the Providence River. A second route, for one circuit, will be through a developer's property at Davol Square with a new easement, across South Street, along the front of the former South Street Power Station and into the new substation.

The new South Street T-Sub will consist of three transmission risers that will be used to terminate the underground transmission cables from Franklin Square, and three circuit switches. In addition, three new 115-11 kV, 33/44/55 MVA LTC transformers will be installed.

A new substation building will be constructed, two stories tall with a basement. The second floor of the new substation includes three 115-11 kV, 33/44/55 MVA LTC transformers and an indoor substation building with indoor metal clad switchgear with twenty-three (23) positions for 11 kV circuits, four (4) position for the 23kV to 11kV transforms and three (3) cap banks. The control rooms for relay protection and controls are also on the second floor. The first floor will house feeder reactors and feeder disconnect switches. The bottom floor is a basement for cable routing.

Following the cutover of all 11 kV circuits to the new substation, the existing South Street 11 kV substation will be de-energized. The South Street 11 kV substation building will be removed following the cutover completion.

3.4 Benefits Summary

The recommended alternative addresses the indoor substation asset condition issues with the existing South Street substation.

3.5 Business and Customer Issues

The following business issues are associated with the recommended alternative solution:

- The proposed investment is included in National Grid's current Business Plan. However, based on the Planning Estimate that was created by ECOE, the current budget is much lower then the project cost.
- NEC has concluded the existing substation site is suitable for the new South Street substation.
- NEC has concluded there is adequate land available on the existing South Street substation site to construct the new substation, and to also lease a portion of the site to the developer for construction of a parking garage.

3.6 Alternatives

The Providence Study notes the importance of the South Street Substation location and the need to retain the 11.5kV supplied downtown network. With this basis and the need to address the asset conditions, the study considered a variety of substation rebuild configurations. The recommended plan is the lowest cost station rebuild configuration then modified by the Study Addendum.

The proposed work to underground the 115 kV lines from Franklin Square to South Street is based on a request from the developer, CV Properties. The National Grid project to replace South Street substation does not require these lines to be placed underground. If the developer's plans were to change, the National Grid project to replace South Street substation would proceed with the existing overhead 115 kV lines remaining in place, with the final span re-routed overhead into the new substation.

3.7 Safety, Environmental and Project Planning Issues

A formal and detailed Cutover Plan will be developed for the transfer of all existing 11 kV circuits to the new substation. This Plan will be developed during the Final Engineering and Design Phase. To assist with this complex outage planning, EIG who

has been supporting the NEEWS project with outage planning and is extremely knowledgeable of the electrical system, has been contracted to lead this deliverable.

Other required consents would include:

- Rhode Island Department of Environmental Management (RIDEM) approval of the project
- Rhode Island Coastal Management Resources Council (CMRC) approval of the storm water discharge from the site.
- Energy Facilities Siting Board (EFSB) approval of the project

There are environmental impacts associated with the construction of the substation. Specifically, the site abuts the Providence River. Storm water discharge will need to be in compliance with CMRC requirements. A plan will be developed to manage and improve the quality of the rain water runoff from the station's impervious surfaces, including the substation building roof and paved areas.

The site is located in downtown Providence, in the heart of the city's Jewelry District. Appropriate substation screening for an urban site will be provided. It is noted that the layout of the site has been planned with the parking garage along the Eddy Street frontage of the site. This garage is to be constructed by a developer on a portion of the site leased from National Grid. This parking garage will serve to provide screening of the substation site from Eddy Street.

Whenever possible, the Environmental Permitting for the National Grid South Street substation project will coordinate with the developer's environmental permitting for the South Street Landing project.

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3.8 Execution Risk Appraisal

Number	Detailed Description of Risk / Opportunity	Probability	Impact		Score		Strategy	Pre-Trigger Mitigation Plan	Residual Risk	Post Trigger Mitigation Plan
			Cost	Schedule	Cost	Schedule				
1	Approval of RIDEM Permit	2	2	3	[redacted]	[redacted]	Mitigate	Design facilities to avoid/minimize and construct utilizing accepted practices.	Design modifications may be required	Keep design group coordinated for a review of design options
2	CRMC Approval	2	2	2	[redacted]	[redacted]	Mitigate	Design facilities to incorporate CRMC stormwater requirements	Design modifications may be required	Keep design group coordinated for a review of design options.
3	Obtaining the required scheduled outage	2	2	2	[redacted]	[redacted]	Accept	Develop plan and increase communication between as scheduled outage approaches.	Construction delays may result from outage postponement.	Continue frequent communication until outage work is concluded.
4	Distribution underground cables will not be able to be tied into exiting cables where desired	3	5	3	[redacted]	9	Accept	Vendor to complete a manhole survey.	Will need to change the splicing location.	Increase available space within manhole by removing abandoned cable.
5	Site Contamination; cost savings associated with site elevation	1	3	2	[redacted]	[redacted]	Mitigate	Risk is mitigated by elevating the site and can be retired once site work is completed	If elevation can be raised, there should not be any risidual risk.	N/A
6	Transmission Line excavations	2	1	2	[redacted]	[redacted]	Accept	Risk is accepted and can be retired once the ductbanks are installed	Delay in construction	N/A
7	Building Demo	2	1	2	[redacted]	[redacted]	Accept	Risk is accepted and can be retired once the building is taken down.	There are no know residual risks	N/A
8	Work Delay Due to coordinating construction schedules with CV Properties construction schedule	1	1	1	[redacted]	[redacted]	Mitigate	Coordinate work with the CV develpers by having monthly construction updates.	Unknown construction delays by the CV developers	Continue to meet with the CV developers until the project is complete
	Total Risk $:	***$10.8M***								

3.9 Permitting

Permit Name	Probability Required (Certain/ Likely/Unlikely)	Duration To Acquire Permit	Status (Complete/ In Progress Not Applied For)	Estimated Completion Date
CMRC	Certain	6 mos.	Not Applied For	12/15
RIDEM	Certain	6 mos.	Not Applied For	12/15
EFSB	Certain	3 mos.	Not Applied For	12/15
USACE	Possible	6 mos.	Not Applied For	12/15

3.10 Investment Recovery

3.10.1 Investment Recovery and Regulatory Implications

Based on current schedules the substation will enter service in FY'19 and will be included in each Fiscal year's Annual ISR Filing until that time.

3.10.2 Customer Impact

This Project results in an indicative first full year revenue requirement when the asset is placed in service equal to approximately $9.94M. This is indicative only. The actual revenue requirement will differ, depending upon the timing of the next rate case and/or the timing of the next filing in which the Project is included in the rate case.

3.10.3 CIAC / Reimbursement

All costs associated with undergrounding the three existing overhead 115 kV transmission lines from Franklin Square to South Street will be reimbursed by the developer of the South Street Landing project. The CIAC amount that has been derived is estimated. Actual reimbursement to be determined once the EPC contractor begins the preliminary engineering of the project.

$M	Prior Yrs	Yr. 1 2015/16	Yr. 2 2016/17	Yr. 3 2017/18	Yr. 4 2018/19	Yr. 5 2019/20	Yr. 6 + 2020/21	Total
CIAC/Reimbursement	0.000	10.916	0.000	0.000	0.696	0.000	0.000	11.612

3.11 Financial Impact to National Grid

3.11.1 Cost Summary Table

Project Number	Project Title	Project Estimate Level (%)	Spend ($M)	Prior Yrs	Current Planning Horizon Yr. 1 2015/16	Yr. 2 2016/17	Yr. 3 2017/18	Yr. 4 2018/19	Yr. 5 2019/20	Total
C051212	South Street Substation Rebuild	+/- 10%	CapEx	0.041	5.484	14.978	15.990	1.583	3.809	41.885
			OpEx	0.000	0.000	0.003	0.003	0.003	0.001	0.010
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.041	5.484	14.981	15.993	1.586	3.810	41.895
C051213	South Street Substation Rebuild	+/- 10%	CapEx	0.021	1.630	5.121	4.633	0.845	1.210	13.460
			OpEx	0.000	0.000	0.003	0.003	0.003	0.001	0.010
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.021	1.630	5.124	4.636	0.848	1.211	13.470
C055584	South Street Substation Rebuild	+/- 10%	CapEx	0.138	3.096	17.959	2.081	0.833	1.534	25.641
			OpEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.138	3.096	17.959	2.081	0.833	1.534	25.641
C055585	South Street Substation Rebuild	+/- 10%	CapEx	0.000	0.764	5.468	0.115	0.216	0.912	7.475
			OpEx	0.000	0.000	0.000	0.000	0.000	0.005	0.005
			Removal	0.000	0.000	0.005	0.005	0.005	0.404	0.419
			Total	0.000	0.764	5.473	0.120	0.221	1.321	7.899
C055586	South Street Substation Rebuild - Franklin Substation Upgrades	+/- 10%	CapEx	0.017	0.739	1.790	0.165	0.018	0.271	3.000
			OpEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.017	0.739	1.790	0.165	0.018	0.271	3.000
C055623	South Street Substation Rebuild - Demolition	+/- 10%	CapEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			OpEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Removal	0.017	0.012	0.012	0.012	0.229	3.163	3.445
			Total	0.017	0.012	0.012	0.012	0.229	3.163	3.445
Total Project Sanction			CapEx	0.217	11.713	45.316	22.984	3.495	7.736	91.461
			OpEx	0.000	0.000	0.006	0.006	0.006	0.007	0.025
			Removal	0.017	0.012	0.017	0.017	0.234	3.567	3.864
			Total	0.234	11.725	45.339	23.007	3.735	11.310	95.350

US Sanction Paper

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3.11.2 Project Budget Summary Table

Project Costs per Business Plan-Transmission

		Current Planning Horizon					
$M	Prior Yrs (Actual)	Yr. 1 2015/16	Yr. 2 2016/17	Yr. 3 2017/18	Yr. 4 2018/19	Yr. 5 2019/20	Total
CapEx	0.155	3.194	9.899	8.203	0.000	0.000	21.452
OpEx	0.000	0.070	0.104	0.086	0.000	0.000	0.260
Removal	0.000	0.246	0.417	0.301	0.000	0.000	0.963
Total Cost in Bus. Plan	0.155	3.510	10.420	8.590	0.000	0.000	22.675

Variance (Business Plan-Project Estimate)

		Current Planning Horizon					
$M	Prior Yrs (Actual)	Yr. 1 2015/16	Yr. 2 2016/17	Yr. 3 2017/18	Yr. 4 2018/19	Yr. 5 2019/20	Total
CapEx	0.000	(1.405)	(15.318)	5.842	(1.067)	(2.717)	(14.664)
OpEx	0.000	0.070	0.104	0.086	0.000	(0.005)	0.255
Removal	0.000	0.246	0.412	0.296	(0.005)	(0.404)	0.544
Total Cost in Bus. Plan	0.000	(1.089)	(14.802)	6.224	(1.072)	(3.126)	(13.865)

Project Costs per Business Plan-Distribution

		Current Planning Horizon					
$M	Prior Yrs (Actual)	Yr. 1 2015/16	Yr. 2 2016/17	Yr. 3 2017/18	Yr. 4 2018/19	Yr. 5 2019/20	Total
CapEx	0.062	4.560	7.260	5.990	0.000	0.000	17.872
OpEx	0.000	0.124	0.197	0.163	0.000	0.000	0.484
Removal	0.017	0.445	2.841	3.158	0.500	0.000	6.960
Total Cost in Bus. Plan	0.079	5.129	10.298	9.311	0.500	0.000	25.316

Variance (Business Plan-Project Estimate)

		Current Planning Horizon					
$M	Prior Yrs (Actual)	Yr. 1 2015/16	Yr. 2 2016/17	Yr. 3 2017/18	Yr. 4 2018/19	Yr. 5 2019/20	Total
CapEx	0.000	(2.554)	(12.839)	(14.633)	(2.428)	(5.019)	(37.473)
OpEx	0.000	0.124	0.191	0.157	(0.006)	(0.002)	0.464
Removal	0.000	0.433	2.829	3.146	0.271	(3.163)	3.515
Total Cost in Bus. Plan	0.000	(1.998)	(9.819)	(11.330)	(2.163)	(8.184)	(33.494)

3.11.3 Cost Assumptions

3.11.4 Net Present Value / Cost Benefit Analysis – Not Financially Driven

Economic measures	5yr	10yr	20yr	Comment
NPV @ Discount rate				
IRR				
MIRR				
Simple Payback in Years				
Total O&M				
Total Capital Investment				
Total Savings				

3.11.5 Additional Impacts - There are no additional impacts to be considered.

3.12 Statements of Support

3.12.1 Supporters

Function	Area	Individual	Responsibility
Investment Planner	Transmission NE	Michelle Park	Endorses relative to 5-year business plan or emergent work.
Investment Planner	Dist. NE	Glen Diconza	Endorses relative to 5-year business plan or emergent work.
Resource Planning	Distribution - New England	Anne Wyman	Endorses Resources, cost estimate, schedule, and Portfolio Alignment
Resource Planning	Trans. Line & Substation - New England	Mark Phillips	Endorses Resources, cost estimate, schedule, and Portfolio Alignment
Engineering & Design	Transmission Planning Projects	Kasia Kulbacka Lisa Sasur	Endorses scope, design, conformance with design standards
Engineering & Design	Substations	Suzan Martuscello	Endorses scope, design, conformance with design standards

Engineering & Design	Transmission & Sub-T Line	Mark Browne	Endorses scope, design, conformance with design standards
Engineering & Design	Protection & Telecom	Leonard Swanson	Endorses scope, design, conformance with design standards
Engineering & Design	Dist. Line and Sub. and Sub.-T Planning	Alan Labarre	Endorses scope, design, conformance with design standards
Project Management	T&D Line NE	Sonny Anand	Endorses resource, cost estimate and schedule

3.12.2 Reviewers

Function	**Individual**
Finance	Keith Fowler
	Philip Horowitz
Regulatory	Peter Zschokke
Jurisdictional Delegate	Jim Patterson
	Carol Sedewitz
Procurement	Art Curran
Control Centers (CC)	John Baudanza
	Michael Gallagher
	Will Houston

4 Appendices

4.1 Sanction Request Breakdown by Project (Partial Sanction only)

$M	C051212	C051213	C055584	C055585	C055586	C055623	Total
CapEx	41.885	13.460	25.651	7.472	3.000	0.000	91.468
OpEx	0.010	0.010	0.000	0.005	0.000	0.000	0.025
Removal	0.000	0.000	0.000	0.404	0.000	3.455	3.859
Total	41.895	13.470	25.651	7.881	3.000	3.455	95.352

4.2 Other Appendices [When inserting pictures/drawings use compress feature]

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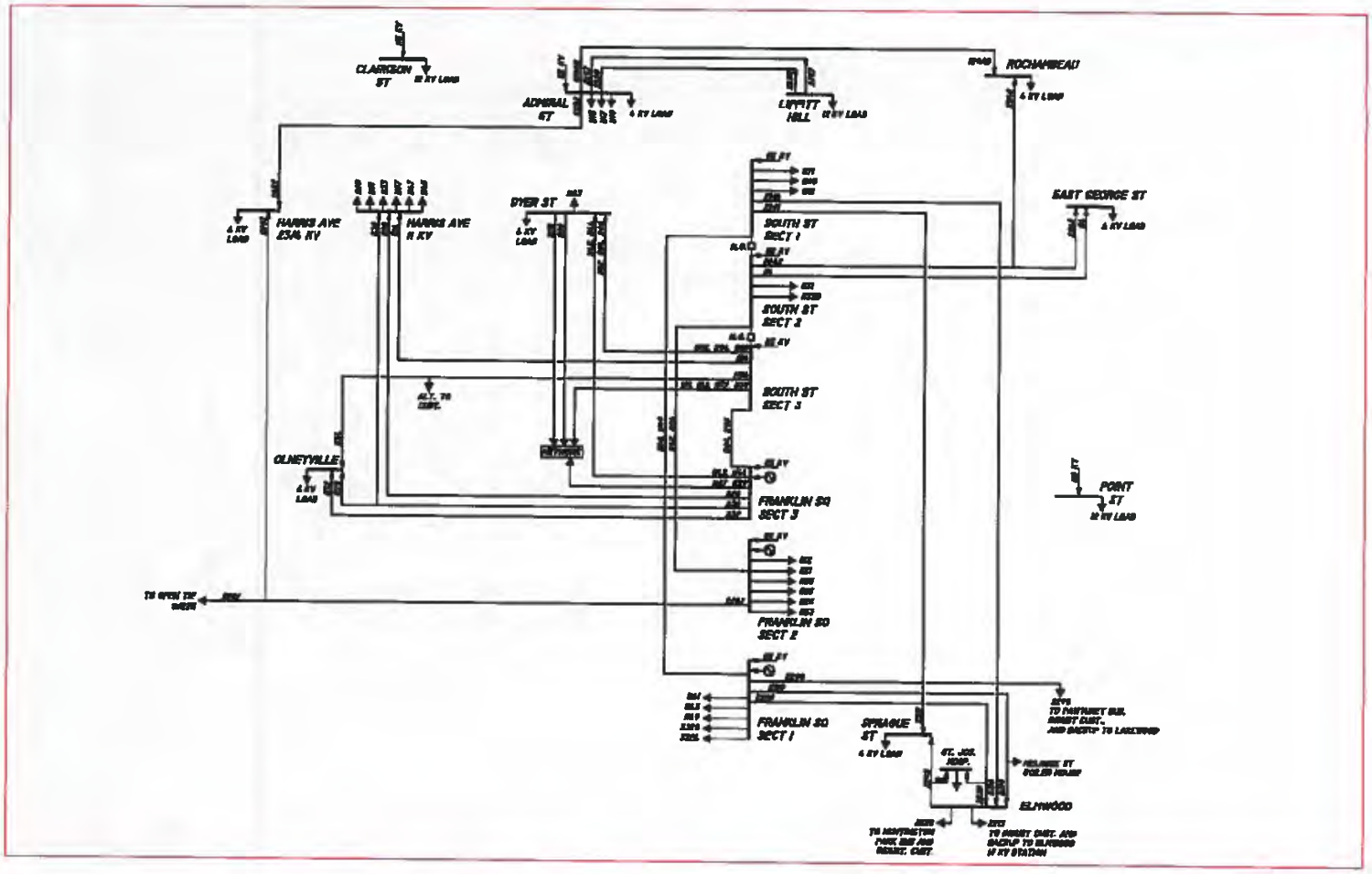
4.2.1 Existing One Line Diagram: South Street, Providence Area 11 kV



[redacted]

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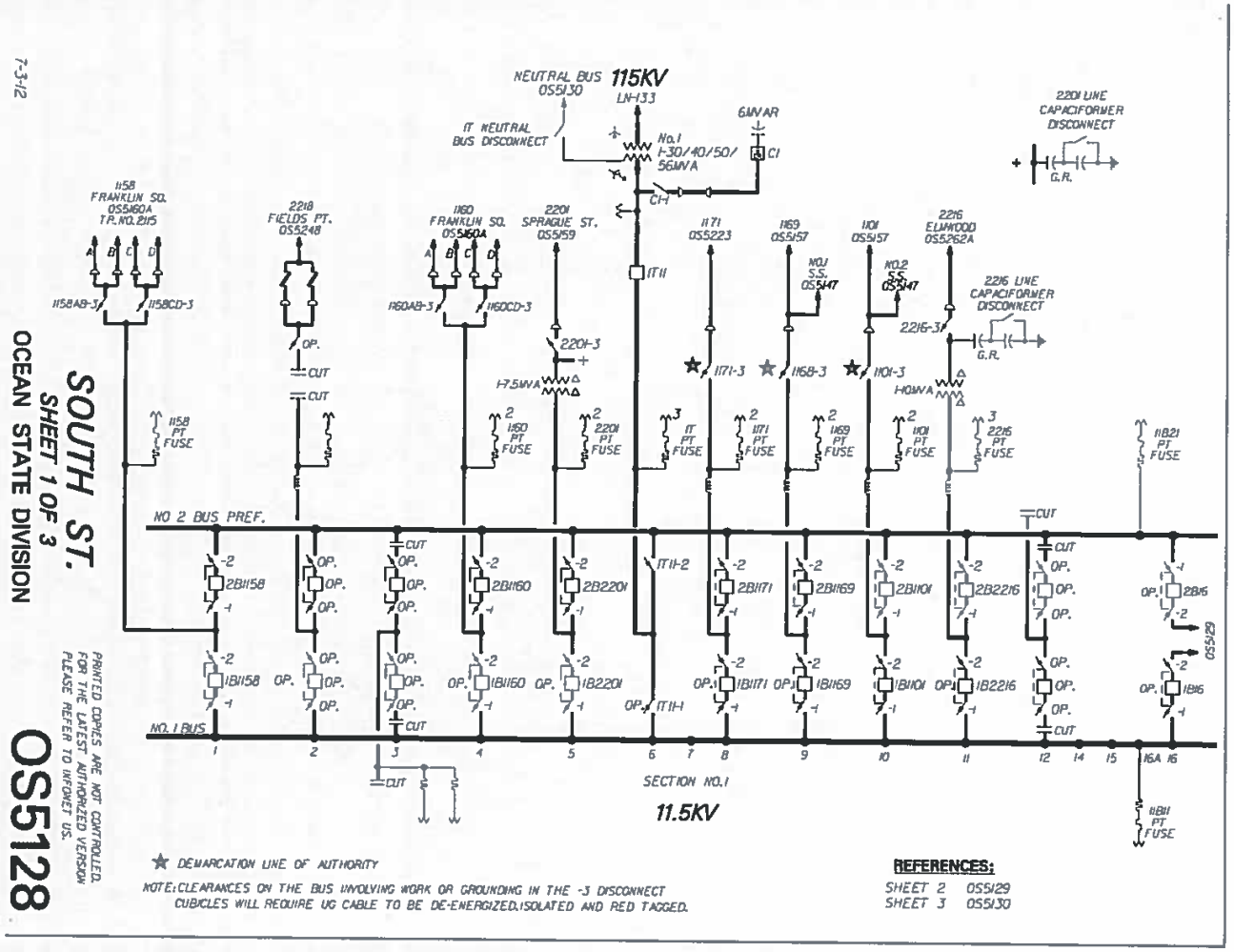
4.2.3 Existing One Line Diagram: South Street, 11 kV Section 1 of 3 (Typical of 3)



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4.2.4 Existing South Street Substation Site

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4.2.5 Existing South Street Substation Building

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4.2.6 Existing South Street Substation Indoor 11 kV

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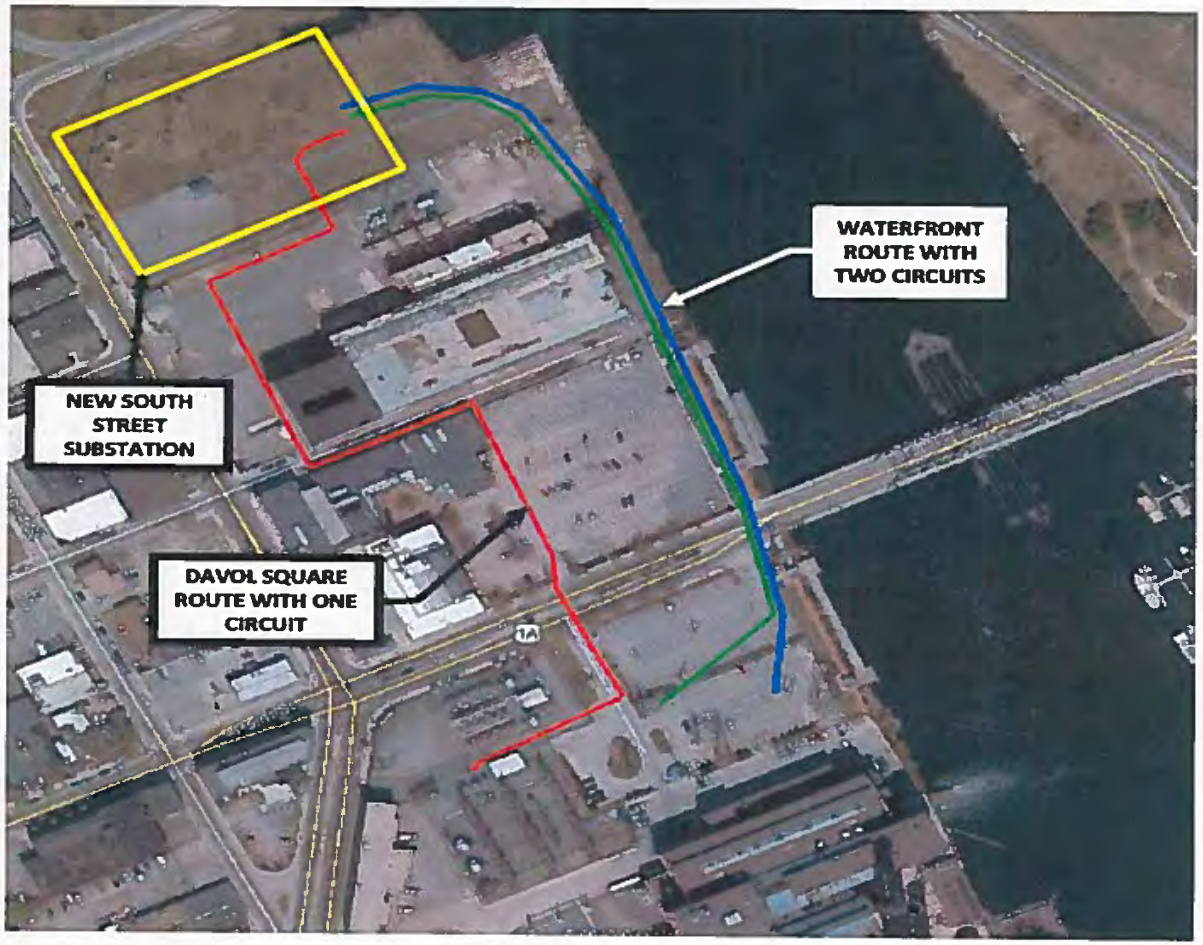
4.2.7 Proposed South Street Substation 115 kV Supply Cable Routes



4.3 NPV Summary (if applicable) - Not Applicable

4.4 Customer Outreach Plan (if applicable)

Customer outreach has begun and is ongoing for the South Street project. A working relationship has been established between the National Grid project team for the South Street project and CV Properties, the developer of the South Street Landing project. Environmental permitting efforts are being coordinated.

Additional customer outreach is planned for other stakeholders, including other abutters and City officials.

C051213

South St repl indoor subst D-LINE

5360-Narragansett Electric and Gas
Project Revision Detail Report

Fund Project Number:	C051213	**USSC #:**	USSC-14-195 v2
Revision:	3	**Budget Version:**	Default
Project Title:	South St repl indoor subst D-LINE		
Project Description:	Replace existing indoor substation at South Street in Providence - DLine work.		

Project Status:	open		
Responsible Person:	ANTUNES, NELSON	**Initiator:**	Livingston, Claire L
Spending Rationale:	Asset Condition	**Funding Type:**	P Electric Distribution Line RI
Budget Class:	Asset Replacement		
Capital by Category:			
Program Code:			
Project Risk Score:	48	**Project Complexity Score:**	29

Project Schedule / Expenditures

Revision Status:	Approved		
Est Start Date:	8/13/2013	**Est Complete Date:**	3/31/2020
Est In-Service Date:	8/30/2019		
TTD Actuals:	$5,113,120	**As Of:**	10/3/2017

Cost Breakdown	Capital	Expense	Removal	Total	Credits
	$11,405,000	$10,000	$0	$11,415,000	$0

Justification / Risk Identification:

<Enter data here>

Project Scope:

<Enter data here>

Project Alternatives Considered:

<Enter data here>

Additional Notes:

8/13/13 CL - Rev1 estimate for budget purposes - FY15-18 splits per RConstable. Note - does not include any 23 kV construction that would be required by early construction due to Brown University.

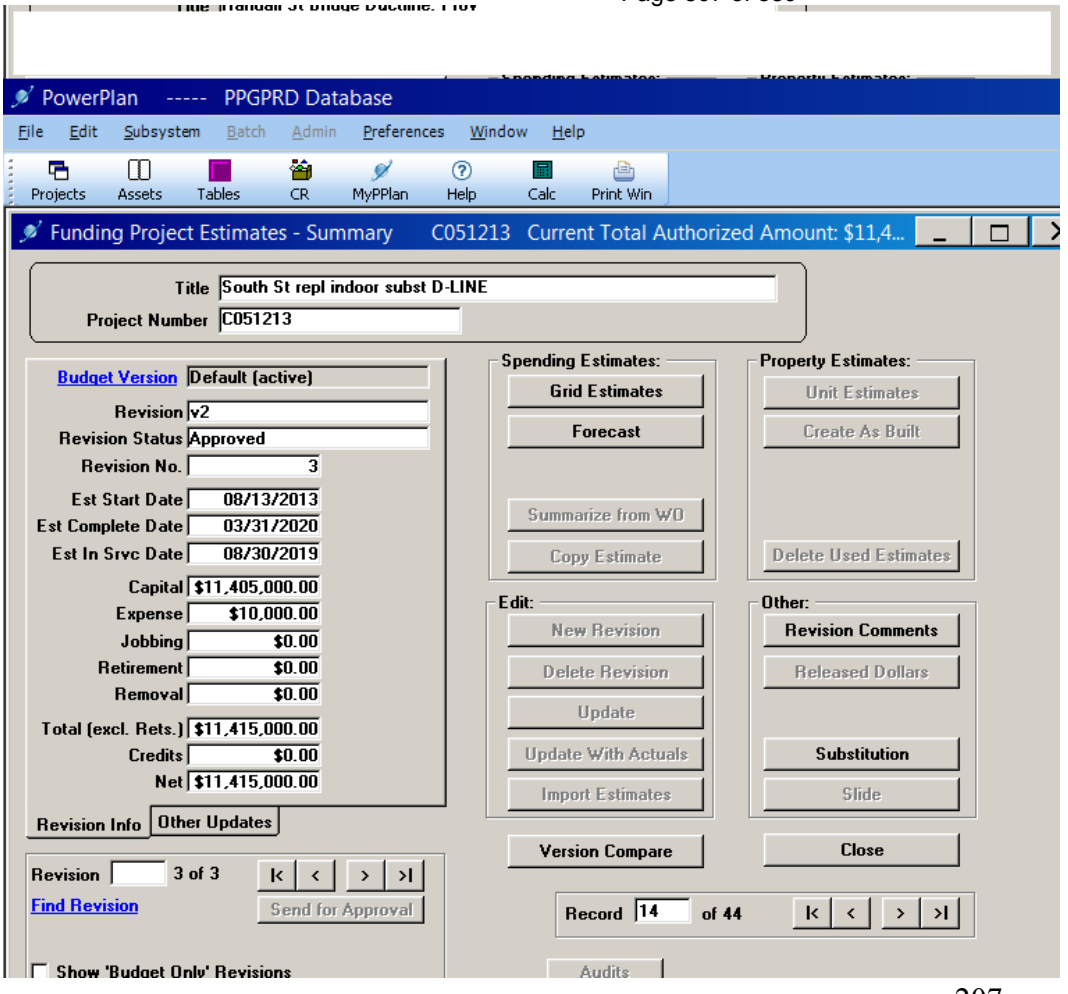
Related Projects:

Project Number: **Project Name:**

Approvals

Line 1:	**Date**	8/5/2015 11:37:01	**Approver**	carlim	USSC Approver
Line 2:	**Date**		**Approver**		
Line 3:	**Date**		**Approver**		
Line 4:	**Date**		**Approver**		
Line 5:	**Date**		**Approver**		

*****Project Authorization is for Approved Revision Total Estimated Cost +10% *****


PowerPlan ----- PPGPRD Database
File Edit Subsystem Batch Admin Preferences Window Help
Projects Assets Tables CR MyPPlan Help Calc Print Win
Funding Project Estimates - Summary C051213 Current Total Authorized Amount: $11,4...
Title South St repl indoor subst D-LINE
Project Number C051213
Budget Version Default (active)
Revision v2
Revision Status Approved
Revision No. 3
Est Start Date 08/13/2013
Est Complete Date 03/31/2020
Est In Srvc Date 08/30/2019
Capital $11,405,000.00
Expense $10,000.00
Jobbing $0.00
Retirement $0.00
Removal $0.00
Total (excl. Rets.) $11,415,000.00
Credits $0.00
Net $11,415,000.00
Revision Info
Other Updates
Revision 3 of 3
Find Revision
Send for Approval
Show 'Budget Only' Revisions
Spending Estimates:
Grid Estimates
Forecast
Summarize from WO
Copy Estimate
Property Estimates:
Unit Estimates
Create As Built
Delete Used Estimates
Edit:
New Revision
Delete Revision
Update
Update With Actuals
Import Estimates
Other:
Revision Comments
Released Dollars
Substitution
Slide
Version Compare
Close
Record 14 of 44
Audits

This document has been redacted for Critical Energy Infrastructure Information (CEII).

US Sanction Paper

Title:	South Street Substation Rebuild	**Sanction Paper #:**	USSC-14-195-V2
Project #:	C051212, C051213, C055584, C055585, C055586, C055623	**Sanction Type:**	Partial Sanction
Operating Company:	The Narragansett Electric Company	**Date of Request:**	6-10-15
Author:	Nelson M. Antunes / Bob Galgano / Ryan Constable	**Sponsor:**	John Gavin, VP Asset Management
Utility Service:	Electricity T&D	**Project Manager:**	Nelson M. Antunes

1 Executive Summary

1.1 Sanctioning Summary:

This paper requests partial sanction of C051212, C051213, C055584, C055585, C055586, and C055623 in the amount $74.500M with a tolerance of +/-10% for the purpose of Design Engineering, Permitting, Procurement of long lead equipment and Preliminary Construction.

The sanction amount is $74.500M broken down into:

$71.475M Capex
$0.025M Opex
$3.000M Removal

NOTE: The potential investment of $95.352M less a CIAC of $11.612M results in a net project cost of $83.740M with a tolerance of +/-25% contingent upon submittal and approval of a Project Sanction paper following completion of the scope above.

1.2 Brief Description:

These projects summarized in the document are described in the "Providence Area Long Term Distribution and Supply Study" ("Providence Study"), dated May 2014 and the "Providence Area Long Term Distribution and Supply Study Addendum" ("Study Addendum"), dated May 2014. The study noted the significant asset condition issues at the South Street Substation ("South St. Sub"), concluded the importance of this location, and the need to maintain an 11.5kV supply to the downtown network from this location. As a result of these findings, the study presented a recommended plan to rebuild the South St. Sub. The Study Addendum addresses certain substation design details and timing issues as a result of internal Substation Engineering and Operations consultation and recent, large scale customer driven development.

US Sanction Paper

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The project includes a new substation on the existing South Street substation site in the City of Providence, R.I. The new substation includes three 115-11 kV, 33/44/55 MVA LTC transformers and an indoor substation building with indoor metal clad switchgear with twenty-three positions for 11 kV circuits, four (4) position for the 23kV to 11kV transformers and three (3) cap banks. Additionally, the project include moving the three 115 kV transmission lines from overhead to underground for 0.3 miles long from Franklin Square to the new South Street substation. The existing South Street 115/11 kV station and existing overhead transmission lines will be removed.

1.3 Summary of Projects:

Project Number	Project Type (Elec only)	Project Title	Estimate Amount ($M)
C051212	D-Sub	South Street Substation Rebuild	41.895
C051213	D-Line	South Street Substation Rebuild	13.470
C055584	T-Sub	South Street Substation Rebuild	25.641
C055585	T-Line	South Street Substation Rebuild	7.899
C055586	T-Sub	South Street Substation Rebuild - Franklin Sub	3.000
C055623	T-Sub	South Street Substation Rebuild - Demolition	3.445
		Total	95.350

1.4 Associated Projects:

N/A

Project Number	Project Title	Estimate Amount
N/A	N/A	$ -
	Total	$ -

1.5 Prior Sanctioning History (including relevant approved Strategies):

N/A

Date	Governance Body	Sanctioned Amount	Potential Project Investment	Paper Title	Sanction Type	Tolerance
6/25/2014	USSC	$23.740M	$64.150M	South Street Substation Rebuild	Partial Sanction	+50%/-25%

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1.6 Next Planned Sanction Review:

Date (Month/Year)	Purpose of Sanction Review
June 2018	Project Sanction South Street Project
March 2020	Projected Closure Sanction Paper

1.7 Category:

Category	Reference to Mandate, Policy, or NPV Assumptions
○ Mandatory ◉ Policy- Driven ○ Justified NPV	National Grid USA EO Internal Strategy Document Distribution Planning Criteria Strategy

1.8 Asset Management Risk Score

Asset Management Risk Score: 48

Primary Risk Score Driver: (Policy Driven Projects Only)

◉ Reliability ○ Environment ○ Health & Safety ○ Not Policy Driven

1.9 Complexity Level: (if applicable)

◉ High Complexity ○ Medium Complexity ○ Low Complexity ○ N/A

Complexity Score: 29

1.10 Process Hazard Assessment

A Process Hazard Assessment (PHA) is required for this project:

◉ Yes ○ No

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1.11 Business Plan:

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
FY16-20 New England Distribution Spending Plan	◉ Yes ○ No	◉ Over ○ Under ○ NA	$33.494M
FY16-20 New England Transmission Spending Plan	◉ Yes ○ No	◉ Over ○ Under ○ NA	$13.865M

1.12 If cost > approved Business Plan how will this be funded?

Re-allocation of funds within the portfolio will be managed by Resource Planning to meet jurisdictional, budgetary, statutory and regulatory requirements.

1.13 Current Planning Horizon:

Current Planning Horizon – Total Project Cost:

		Current Planning Horizon						
		Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	Prior Yrs	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
CapEx	0.217	11.713	45.316	22.984	3.495	7.736	0.000	91.461
OpEx	0.000	0.000	0.006	0.006	0.006	0.007	0.000	0.025
Removal	0.017	0.012	0.017	0.017	0.234	3.567	0.000	3.864
CIAC/Reimbursement	0.000	(10.916)	0.000	0.000	(0.696)	0.000	0.000	(11.612)
Total	0.234	0.809	45.339	23.007	3.039	11.310	0.000	83.738

Current Planning Horizon – Distribution:

		Current Planning Horizon						
		Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	Prior Yrs	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
CapEx	0.062	7.114	20.099	20.623	2.428	5.019	0.000	55.345
OpEx	0.000	0.000	0.006	0.006	0.006	0.002	0.000	0.020
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CIAC/Reimbursement	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	0.062	7.114	20.105	20.629	2.434	5.021	0.000	55.365

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Current Planning Horizon - Transmission

		Current Planning Horizon						
		Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	Prior Yrs	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
CapEx	0.155	4.599	25.217	2.361	1.067	2.717	0.000	36.116
OpEx	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.005
Removal	0.017	0.012	0.017	0.017	0.234	3.567	0.000	3.864
CIAC/Reimbursement	0.000	(10.916)	0.000	0.000	(0.696)	0.000	0.000	(11.612)
Total	0.172	(6.305)	25.234	2.378	0.605	6.289	0.000	28.373

1.14 Key Milestones

Milestone	**Target Date: (Month/Year)**
Partial Sanction	June 2015
Permitting and Licensing Complete	December 2015
Complete Final Design	November 2016
Start of South Street Substation Construction (T,D & Sub)	February 2016
Ready for Load (In Phases)	November 2018
Complete Cutovers from Existing South Street to New Substation	April 2019
Existing Building Removal	July 2019
Construction Complete	August 2019
Project Closure Report	March 2020

1.15 Resources, Operations and Procurement:

Resource Sourcing			
Engineering & Design Resources to be provided	☑ Internal		☑ Contractor
Construction/Implementation Resources to be provided	☑ Internal		☑ Contractor
Resource Delivery			
Availability of internal resources to deliver project:	○ Red	○ Amber	◉ Green

US Sanction Paper

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Availability of external resources to deliver project:	○ Red	○ Amber	◉ Green
Operational Impact			
Outage impact on network system:	○ Red	○ Amber	◉ Green
Procurement Impact			
Procurement impact on network system:	○ Red	○ Amber	◉ Green

1.16 Key Issues (include mitigation of Red or Amber Resources):

1	Receipt of Permits (RIDEM, CRMC, EFSB, Zoning)
2	Timely customer payment of cost for undergrounding the 115 kV transmission line.
3	Development and execution of 11 kV circuit cutover plan.
4	Coordination with other ongoing construction in the immediate area of project

1.17 Climate Change:

Contribution to National Grid's 2050 80% emissions reduction target:	◉ Neutral	○ Positive	○ Negative
Impact on adaptability of network for future climate change:	◉ Neutral	○ Positive	○ Negative

1.18 List References:

1	Providence Area Long Term Distribution and Supply Study, May 2014
2	Providence Area Long Term Distribution and Supply Study Addendum, May 2014
3	Conceptual Engineering Report - New South Street Substation, May 2014
4	Asset Condition Report – South Street Substation, January 2011

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2 Decisions

The US Sanctioning Committee (USSC) at a meeting held on June 10, 2015:

(a) APPROVED the investment of $74.500M and a tolerance of +/-10% for the purpose of Design Engineering, Permitting, Procurement of major Equipment and Preliminary Construction for the reasons stated above.

(b) NOTED the potential investment of $95.352M less a CIAC of $11.612M with a tolerance of +/-25%, contingent upon submittal and approval of a Project Sanction paper following completion of Design Engineering, Permit approvals, and the start of construction activities.

(c) NOTED that Nelson Antunes is the Project Manager and Sonny Anand has the approved financial delegation to undertake the activities stated in (a).

Signature.....Date.....6/29/15

Margaret Smyth
US Chief Financial Officer
Chair, US Sanctioning Committee

US Sanction Paper

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3 Sanction Paper Detail

Title:	South Street Substation	**Sanction Paper #:**	USSC-14-195-V2
Project #:	C051212, C051213, C055584, C055585, C055586, C055623	**Sanction Type:**	Partial Sanction
Operating Company:	The Narragansett Electric Company	**Date of Request:**	6-10-2015
Author:	Nelson M. Antunes / Bob Galgano / Ryan Constable	**Sponsor:**	John Gavin, VP Asset Management
Utility Service:	Electricity T&D	**Project Manager:**	Nelson M. Antunes

3.1 Background

South Street substation is a major 115/11 kV supply substation serving downtown Providence, RI and the surrounding area. In combination with the Franklin Square 115/11 kV substation, the two substations serve a combined peak load of approximately 148 MVA. The South Street and Franklin Square substations supply the Providence Downtown network, one 23 kV substation, one 11 kV substation, eight (8) 4 kV distribution substations, the Providence Hurricane Barrier, the main campus of Brown University, Women's and Infant's Hospital, RI Hospital, St. Joseph's Hospital, Roger Williams Hospital, the VA Hospital and local 11.5 kV distribution customers.

Figures 4.2.1 through 4.2.3 and Figures 4.2.4 through 4.2.6 show one line electric diagrams and site pictures respectively of the South St Sub and surrounding facilities. Figures 4.2.4 through 4.2.6 show pictures of the existing South St Substation.

The Providence Area Long Term Supply and Distribution Study provide a high-level conceptual plan for the future development of the supply and distribution system in the City of Providence and adjacent communities. This study has identified the need for construction of a new 115/11 kV substation to replace the existing South Street substation as a result of asset condition issues described in Section 3.2.

In the Fall of 2013, National Grid was approached by a developer proposing a large scale project in the immediate area of the South Street Substation. As currently envisioned by the developer, the former South Street Power Station ("Dynamo House") and the adjacent Davol Square property would be used to construct a state-of-the-art nursing education center for Rhode Island College and the University of Rhode Island, and administrative office space for Brown University.[1] This redevelopment plan

[1] Societal benefit represented informally by the Davol Square developer as job creation on the order or approximately 1,500 construction jobs and 540 permanent jobs with potential economic growth of $29 million in annual earnings and $64 million in statewide economic output.

included three potential factors that could impact the Providence Study recommendations:

- The relocation of the existing South St. Sub (away from the Dynamo House);
- The rebuild of the existing transmission taps to South St. Sub in an underground configuration;
- The lease or transfer of a portion of the South St. Sub parcel for construction of a parking garage.

As described above, the rebuild or relocation of the South St. Sub on the existing site but away from the Dynamo House was recommended by the Providence Study. Although not recommended in the Providence Study, rebuilding the South Street Substation 115kV taps in an underground configuration was estimated. This estimate and scope was communicated to the developer as requiring a customer contribution. While contribution discussions are still ongoing, the full cost of this factor is presented in Section 3.10.3 as a Contribution In Aid of Construction ("CIAC"). A Conceptual Engineering review was conducted in the Fall/Winter of 2013 to determine the feasibility of leasing a portion of the station property for a parking garage. This effort concluded the parking garage was feasible. Additional details regarding these factors are described in the Study Addendum, however in summary:

- The relocation/rebuild of the existing South St. Sub was the potential recommendation of the draft Providence Study at the time of the Davol Square developer's request.
- The rebuild of the existing transmission taps to South St. Sub in an underground configuration is not recommended, but can be completed at the customer's cost.
- The lease or transfer of a portion of the South St. Sub parcel for construction of a parking garage is technically feasible.

3.2 Drivers

South Street Substation replacement is driven by asset condition concerns. These concerns are described in the Asset Condition Report for the South Street Substation which is summarized in the Providence Area Long Term Distribution and Supply Study.

The Asset Condition Report for the South Street substation describes issues and recommends the replacement of a variety of station components. The building layout is such that it precludes the implementation of modern installation standards in order to replace original equipment. Additionally, spare parts for the protection components are unavailable and will be irreplaceable in the event of a failure. Lastly, maintenance work is time consuming and because of previously stated issues results in custom site-specific repairs.

Specific asset condition issues exist for the transformers, breakers, switches, feeder reactors, and the battery system. Transformer concerns include past bushing failures, top cover leaks, and partial internal discharge primarily associated with the #2216 11.5kV to 23kV unit. A number of 11.5kV breakers have reduced fault interrupting performance due to their outdated design. Also, replacement bushings, mechanisms and live parts for these breakers are no longer commercially available. Certain 11.5kV gang operated switches have operational issues. In some of the bays these switches are mounted in such a manner that replacement requires both the #1 and #2 11.5 kV buses to be taken out of service. The existing reactors are the limiting elements for some feeders and cannot be replaced with similar or larger units. Lastly, the battery system is approximately 18 years old and planned for replacement.

3.3 Project Description

The proposed project consists of constructing a new South Street substation on the existing South Street site, transferring all 11 kV circuits to the new substation, and removing the existing 115-11 kV substation.

The 115 kV supply to the new substation will be via three new 115 kV underground cables. The cables will terminate at new structures at the Franklin Square substation, and be routed along two diverse routes to the new South Street substation. One route, for two cable circuits, will be on National Grid owned land along the Providence River. A second route, for one circuit, will be through a developer's property at Davol Square with a new easement, across South Street, along the front of the former South Street Power Station and into the new substation.

The new South Street T-Sub will consist of three transmission risers that will be used to terminate the underground transmission cables from Franklin Square, and three circuit switches. In addition, three new 115-11 kV, 33/44/55 MVA LTC transformers will be installed.

A new substation building will be constructed, two stories tall with a basement. The second floor of the new substation includes three 115-11 kV, 33/44/55 MVA LTC transformers and an indoor substation building with indoor metal clad switchgear with twenty-three (23) positions for 11 kV circuits, four (4) position for the 23kV to 11kV transforms and three (3) cap banks. The control rooms for relay protection and controls are also on the second floor. The first floor will house feeder reactors and feeder disconnect switches. The bottom floor is a basement for cable routing.

Following the cutover of all 11 kV circuits to the new substation, the existing South Street 11 kV substation will be de-energized. The South Street 11 kV substation building will be removed following the cutover completion.

3.4 Benefits Summary

The recommended alternative addresses the indoor substation asset condition issues with the existing South Street substation.

3.5 Business and Customer Issues

The following business issues are associated with the recommended alternative solution:

- The proposed investment is included in National Grid's current Business Plan. However, based on the Planning Estimate that was created by ECOE, the current budget is much lower then the project cost.
- NEC has concluded the existing substation site is suitable for the new South Street substation.
- NEC has concluded there is adequate land available on the existing South Street substation site to construct the new substation, and to also lease a portion of the site to the developer for construction of a parking garage.

3.6 Alternatives

The Providence Study notes the importance of the South Street Substation location and the need to retain the 11.5kV supplied downtown network. With this basis and the need to address the asset conditions, the study considered a variety of substation rebuild configurations. The recommended plan is the lowest cost station rebuild configuration then modified by the Study Addendum.

The proposed work to underground the 115 kV lines from Franklin Square to South Street is based on a request from the developer, CV Properties. The National Grid project to replace South Street substation does not require these lines to be placed underground. If the developer's plans were to change, the National Grid project to replace South Street substation would proceed with the existing overhead 115 kV lines remaining in place, with the final span re-routed overhead into the new substation.

3.7 Safety, Environmental and Project Planning Issues

A formal and detailed Cutover Plan will be developed for the transfer of all existing 11 kV circuits to the new substation. This Plan will be developed during the Final Engineering and Design Phase. To assist with this complex outage planning, EIG who

has been supporting the NEEWS project with outage planning and is extremely knowledgeable of the electrical system, has been contracted to lead this deliverable.

Other required consents would include:

- Rhode Island Department of Environmental Management (RIDEM) approval of the project
- Rhode Island Coastal Management Resources Council (CMRC) approval of the storm water discharge from the site.
- Energy Facilities Siting Board (EFSB) approval of the project

There are environmental impacts associated with the construction of the substation. Specifically, the site abuts the Providence River. Storm water discharge will need to be in compliance with CMRC requirements. A plan will be developed to manage and improve the quality of the rain water runoff from the station's impervious surfaces, including the substation building roof and paved areas.

The site is located in downtown Providence, in the heart of the city's Jewelry District. Appropriate substation screening for an urban site will be provided. It is noted that the layout of the site has been planned with the parking garage along the Eddy Street frontage of the site. This garage is to be constructed by a developer on a portion of the site leased from National Grid. This parking garage will serve to provide screening of the substation site from Eddy Street.

Whenever possible, the Environmental Permitting for the National Grid South Street substation project will coordinate with the developer's environmental permitting for the South Street Landing project.

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3.8 Execution Risk Appraisal

Number	Detailed Description of Risk / Opportunity	Probability	Impact		Score		Strategy	Pre-Trigger Mitigation Plan	Residual Risk	Post Trigger Mitigation Plan
			Cost	Schedule	Cost	Schedule				
1	Approval of RIDEM Permit	2	2	3	[redacted]	[redacted]	Mitigate	Design facilities to avoid/minimize and construct utilizing accepted practices.	Design modifications may be required	Keep design group coordinated for a review of design options
2	CRMC Approval	2	2	2	[redacted]	[redacted]	Mitigate	Design facilities to incorporate CRMC stormwater requirements	Design modifications may be required	Keep design group coordinated for a review of design options.
3	Obtaining the required scheduled outage	2	2	2	[redacted]	[redacted]	Accept	Develop plan and increase communication between as scheduled outage approaches.	Construction delays may result from outage postponement.	Continue frequent communication until outage work is concluded.
4	Distribution underground cables will not be able to be tied into exiting cables where desired	3	5	3	[redacted]	9	Accept	Vendor to complete a manhole survey.	Will need to change the splicing location.	Increase available space within manhole by removing abandoned cable.
5	Site Contamination; cost savings associated with site elevation	1	3	2	[redacted]	[redacted]	Mitigate	Risk is mitigated by elevating the site and can be retired once site work is completed	If elevation can be raised, there should not be any risidual risk.	N/A
6	Transmission Line excavations	2	1	2	[redacted]	[redacted]	Accept	Risk is accepted and can be retired once the ductbanks are installed	Delay in construction	N/A
7	Building Demo	2	1	2	[redacted]	[redacted]	Accept	Risk is accepted and can be retired once the building is taken down.	There are no know residual risks	N/A
8	Work Delay Due to coordinating construction schedules with CV Properties construction schedule	1	1	1	[redacted]	[redacted]	Mitigate	Coordinate work with the CV develpers by having monthly construction updates.	Unknown construction delays by the CV developers	Continue to meet with the CV developers until the project is complete
	Total Risk $:	***$10.8M***								

3.9 Permitting

Permit Name	Probability Required (Certain/ Likely/Unlikely)	Duration To Acquire Permit	Status (Complete/ In Progress Not Applied For)	Estimated Completion Date
CMRC	Certain	6 mos.	Not Applied For	12/15
RIDEM	Certain	6 mos.	Not Applied For	12/15
EFSB	Certain	3 mos.	Not Applied For	12/15
USACE	Possible	6 mos.	Not Applied For	12/15

3.10 Investment Recovery

3.10.1 Investment Recovery and Regulatory Implications

Based on current schedules the substation will enter service in FY'19 and will be included in each Fiscal year's Annual ISR Filing until that time.

3.10.2 Customer Impact

This Project results in an indicative first full year revenue requirement when the asset is placed in service equal to approximately $9.94M. This is indicative only. The actual revenue requirement will differ, depending upon the timing of the next rate case and/or the timing of the next filing in which the Project is included in the rate case.

3.10.3 CIAC / Reimbursement

All costs associated with undergrounding the three existing overhead 115 kV transmission lines from Franklin Square to South Street will be reimbursed by the developer of the South Street Landing project. The CIAC amount that has been derived is estimated. Actual reimbursement to be determined once the EPC contractor begins the preliminary engineering of the project.

$M	Prior Yrs	Yr. 1 2015/16	Yr. 2 2016/17	Yr. 3 2017/18	Yr. 4 2018/19	Yr. 5 2019/20	Yr. 6 + 2020/21	Total
CIAC/Reimbursement	0.000	10.916	0.000	0.000	0.696	0.000	0.000	11.612

3.11 Financial Impact to National Grid

3.11.1 Cost Summary Table

Project Number	Project Title	Project Estimate Level (%)	Spend ($M)	Prior Yrs	Current Planning Horizon Yr. 1 2015/16	Yr. 2 2016/17	Yr. 3 2017/18	Yr. 4 2018/19	Yr. 5 2019/20	Total
C051212	South Street Substation Rebuild	+/- 10%	CapEx	0.041	5.484	14.978	15.990	1.583	3.809	41.885
			OpEx	0.000	0.000	0.003	0.003	0.003	0.001	0.010
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.041	5.484	14.981	15.993	1.586	3.810	41.895
C051213	South Street Substation Rebuild	+/- 10%	CapEx	0.021	1.630	5.121	4.633	0.845	1.210	13.460
			OpEx	0.000	0.000	0.003	0.003	0.003	0.001	0.010
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.021	1.630	5.124	4.636	0.848	1.211	13.470
C055584	South Street Substation Rebuild	+/- 10%	CapEx	0.138	3.096	17.959	2.081	0.833	1.534	25.641
			OpEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.138	3.096	17.959	2.081	0.833	1.534	25.641
C055585	South Street Substation Rebuild	+/- 10%	CapEx	0.000	0.764	5.468	0.115	0.216	0.912	7.475
			OpEx	0.000	0.000	0.000	0.000	0.000	0.005	0.005
			Removal	0.000	0.000	0.005	0.005	0.005	0.404	0.419
			Total	0.000	0.764	5.473	0.120	0.221	1.321	7.899
C055586	South Street Substation Rebuild - Franklin Substation Upgrades	+/- 10%	CapEx	0.017	0.739	1.790	0.165	0.018	0.271	3.000
			OpEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.017	0.739	1.790	0.165	0.018	0.271	3.000
C055623	South Street Substation Rebuild - Demolition	+/- 10%	CapEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			OpEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Removal	0.017	0.012	0.012	0.012	0.229	3.163	3.445
			Total	0.017	0.012	0.012	0.012	0.229	3.163	3.445
Total Project Sanction			CapEx	0.217	11.713	45.316	22.984	3.495	7.736	91.461
			OpEx	0.000	0.000	0.006	0.006	0.006	0.007	0.025
			Removal	0.017	0.012	0.017	0.017	0.234	3.567	3.864
			Total	0.234	11.725	45.339	23.007	3.735	11.310	95.350

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3.11.2 Project Budget Summary Table

Project Costs per Business Plan-Transmission

		Current Planning Horizon					
$M	Prior Yrs (Actual)	Yr. 1 2015/16	Yr. 2 2016/17	Yr. 3 2017/18	Yr. 4 2018/19	Yr. 5 2019/20	Total
CapEx	0.155	3.194	9.899	8.203	0.000	0.000	21.452
OpEx	0.000	0.070	0.104	0.086	0.000	0.000	0.260
Removal	0.000	0.246	0.417	0.301	0.000	0.000	0.963
Total Cost in Bus. Plan	0.155	3.510	10.420	8.590	0.000	0.000	22.675

Variance (Business Plan-Project Estimate)

		Current Planning Horizon					
$M	Prior Yrs (Actual)	Yr. 1 2015/16	Yr. 2 2016/17	Yr. 3 2017/18	Yr. 4 2018/19	Yr. 5 2019/20	Total
CapEx	0.000	(1.405)	(15.318)	5.842	(1.067)	(2.717)	(14.664)
OpEx	0.000	0.070	0.104	0.086	0.000	(0.005)	0.255
Removal	0.000	0.246	0.412	0.296	(0.005)	(0.404)	0.544
Total Cost in Bus. Plan	0.000	(1.089)	(14.802)	6.224	(1.072)	(3.126)	(13.865)

Project Costs per Business Plan-Distribution

		Current Planning Horizon					
$M	Prior Yrs (Actual)	Yr. 1 2015/16	Yr. 2 2016/17	Yr. 3 2017/18	Yr. 4 2018/19	Yr. 5 2019/20	Total
CapEx	0.062	4.560	7.260	5.990	0.000	0.000	17.872
OpEx	0.000	0.124	0.197	0.163	0.000	0.000	0.484
Removal	0.017	0.445	2.841	3.158	0.500	0.000	6.960
Total Cost in Bus. Plan	0.079	5.129	10.298	9.311	0.500	0.000	25.316

Variance (Business Plan-Project Estimate)

		Current Planning Horizon					
$M	Prior Yrs (Actual)	Yr. 1 2015/16	Yr. 2 2016/17	Yr. 3 2017/18	Yr. 4 2018/19	Yr. 5 2019/20	Total
CapEx	0.000	(2.554)	(12.839)	(14.633)	(2.428)	(5.019)	(37.473)
OpEx	0.000	0.124	0.191	0.157	(0.006)	(0.002)	0.464
Removal	0.000	0.433	2.829	3.146	0.271	(3.163)	3.515
Total Cost in Bus. Plan	0.000	(1.998)	(9.819)	(11.330)	(2.163)	(8.184)	(33.494)

3.11.3 Cost Assumptions

3.11.4 Net Present Value / Cost Benefit Analysis – Not Financially Driven

Economic measures	5yr	10yr	20yr	Comment
NPV @ Discount rate				
IRR				
MIRR				
Simple Payback in Years				
Total O&M				
Total Capital Investment				
Total Savings				

3.11.5 Additional Impacts - There are no additional impacts to be considered.

3.12 Statements of Support

3.12.1 Supporters

Function	Area	Individual	Responsibility
Investment Planner	Transmission NE	Michelle Park	Endorses relative to 5-year business plan or emergent work.
Investment Planner	Dist. NE	Glen Diconza	Endorses relative to 5-year business plan or emergent work.
Resource Planning	Distribution - New England	Anne Wyman	Endorses Resources, cost estimate, schedule, and Portfolio Alignment
Resource Planning	Trans. Line & Substation - New England	Mark Phillips	Endorses Resources, cost estimate, schedule, and Portfolio Alignment
Engineering & Design	Transmission Planning Projects	Kasia Kulbacka Lisa Sasur	Endorses scope, design, conformance with design standards
Engineering & Design	Substations	Suzan Martuscello	Endorses scope, design, conformance with design standards

Engineering & Design	Transmission & Sub-T Line	Mark Browne	Endorses scope, design, conformance with design standards
Engineering & Design	Protection & Telecom	Leonard Swanson	Endorses scope, design, conformance with design standards
Engineering & Design	Dist. Line and Sub. and Sub.-T Planning	Alan Labarre	Endorses scope, design, conformance with design standards
Project Management	T&D Line NE	Sonny Anand	Endorses resource, cost estimate and schedule

3.12.2 Reviewers

Function	**Individual**
Finance	Keith Fowler
	Philip Horowitz
Regulatory	Peter Zschokke
Jurisdictional Delegate	Jim Patterson
	Carol Sedewitz
Procurement	Art Curran
Control Centers (CC)	John Baudanza
	Michael Gallagher
	Will Houston

4 Appendices

4.1 Sanction Request Breakdown by Project (Partial Sanction only)

$M	C051212	C051213	C055584	C055585	C055586	C055623	Total
CapEx	41.885	13.460	25.651	7.472	3.000	0.000	91.468
OpEx	0.010	0.010	0.000	0.005	0.000	0.000	0.025
Removal	0.000	0.000	0.000	0.404	0.000	3.455	3.859
Total	41.895	13.470	25.651	7.881	3.000	3.455	95.352

4.2 Other Appendices [When inserting pictures/drawings use compress feature]

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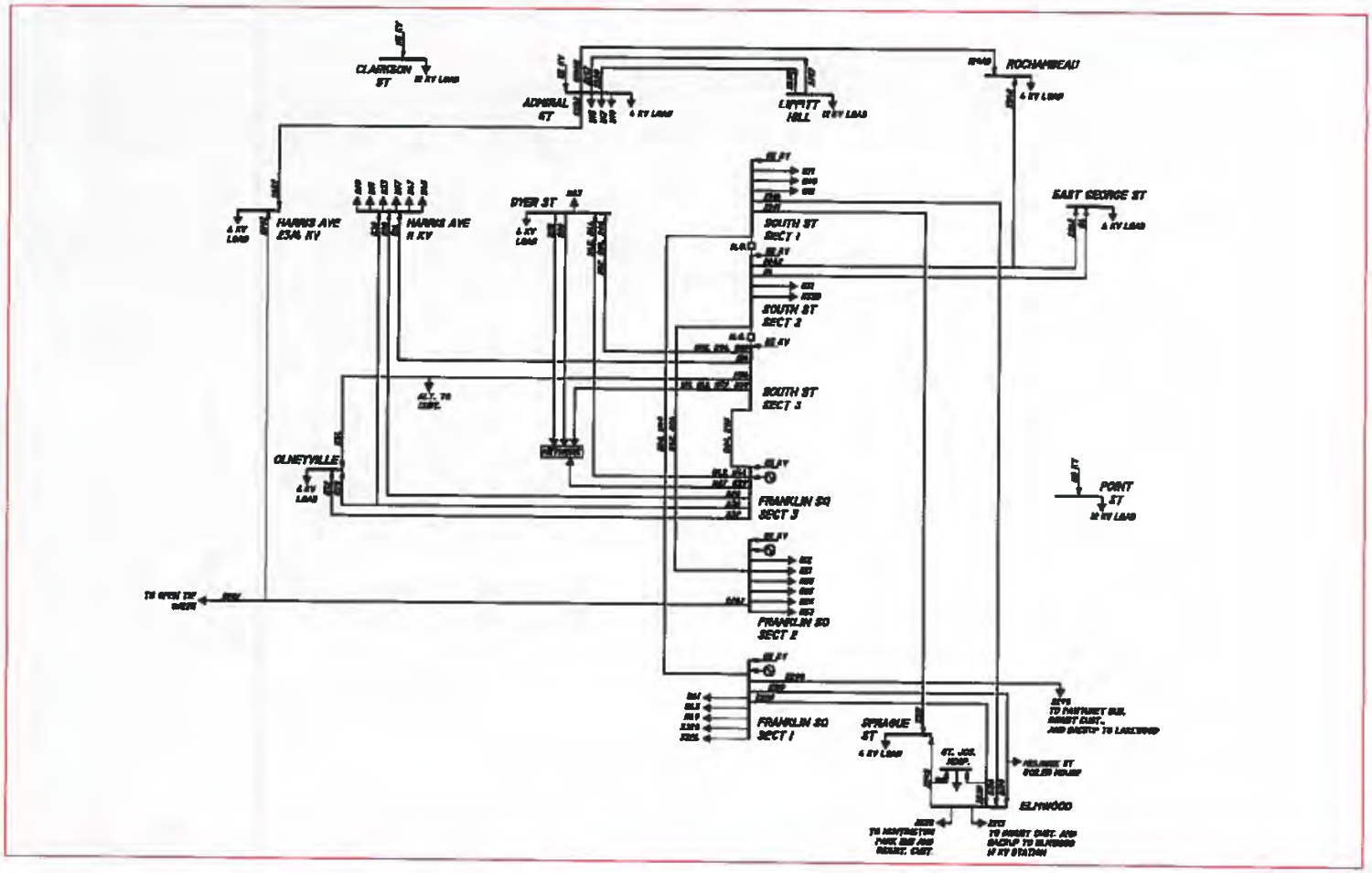
4.2.1 Existing One Line Diagram: South Street, Providence Area 11 kV



[redacted]

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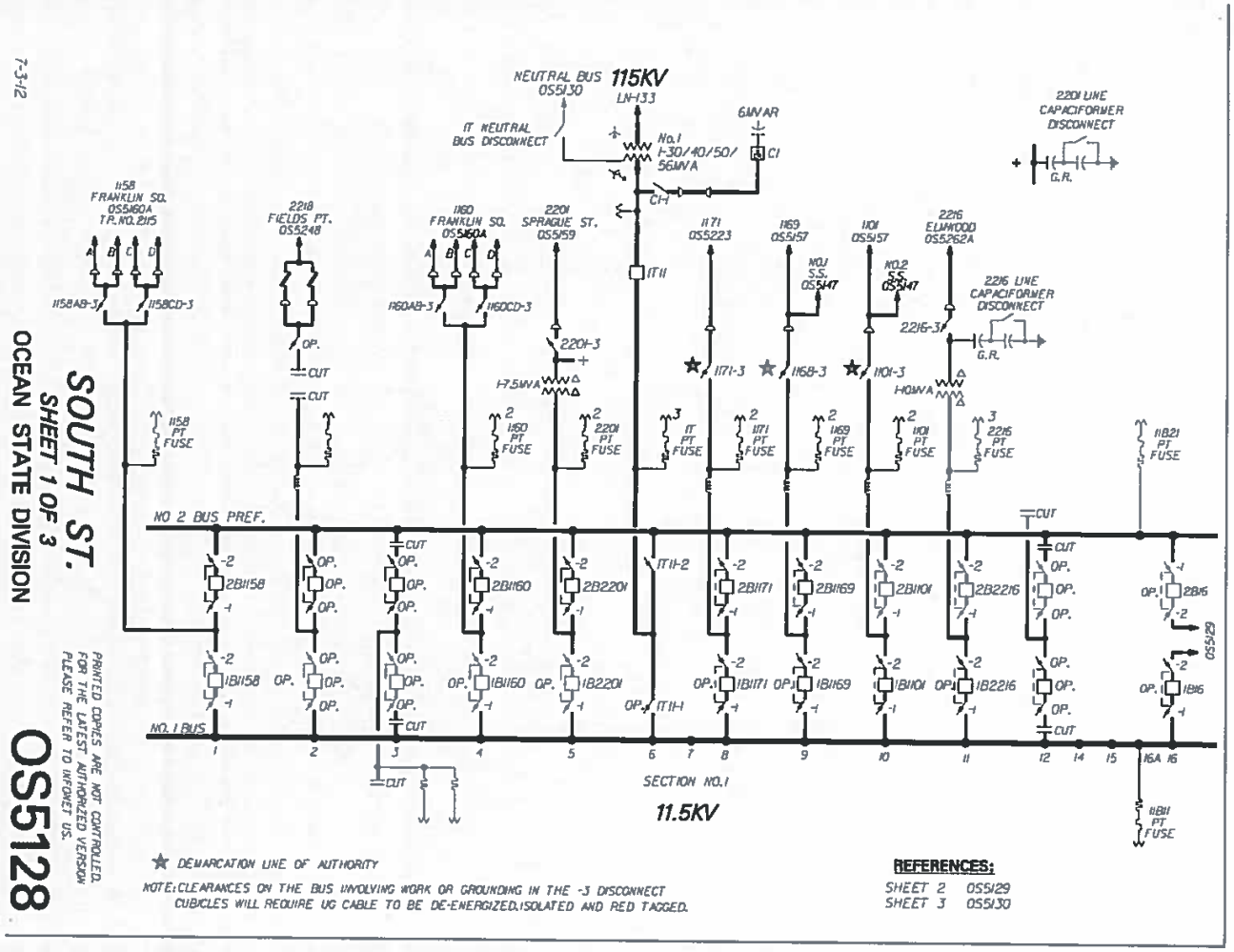
4.2.3 Existing One Line Diagram: South Street, 11 kV Section 1 of 3 (Typical of 3)



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4.2.4 Existing South Street Substation Site

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4.2.5 Existing South Street Substation Building

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4.2.6 Existing South Street Substation Indoor 11 kV

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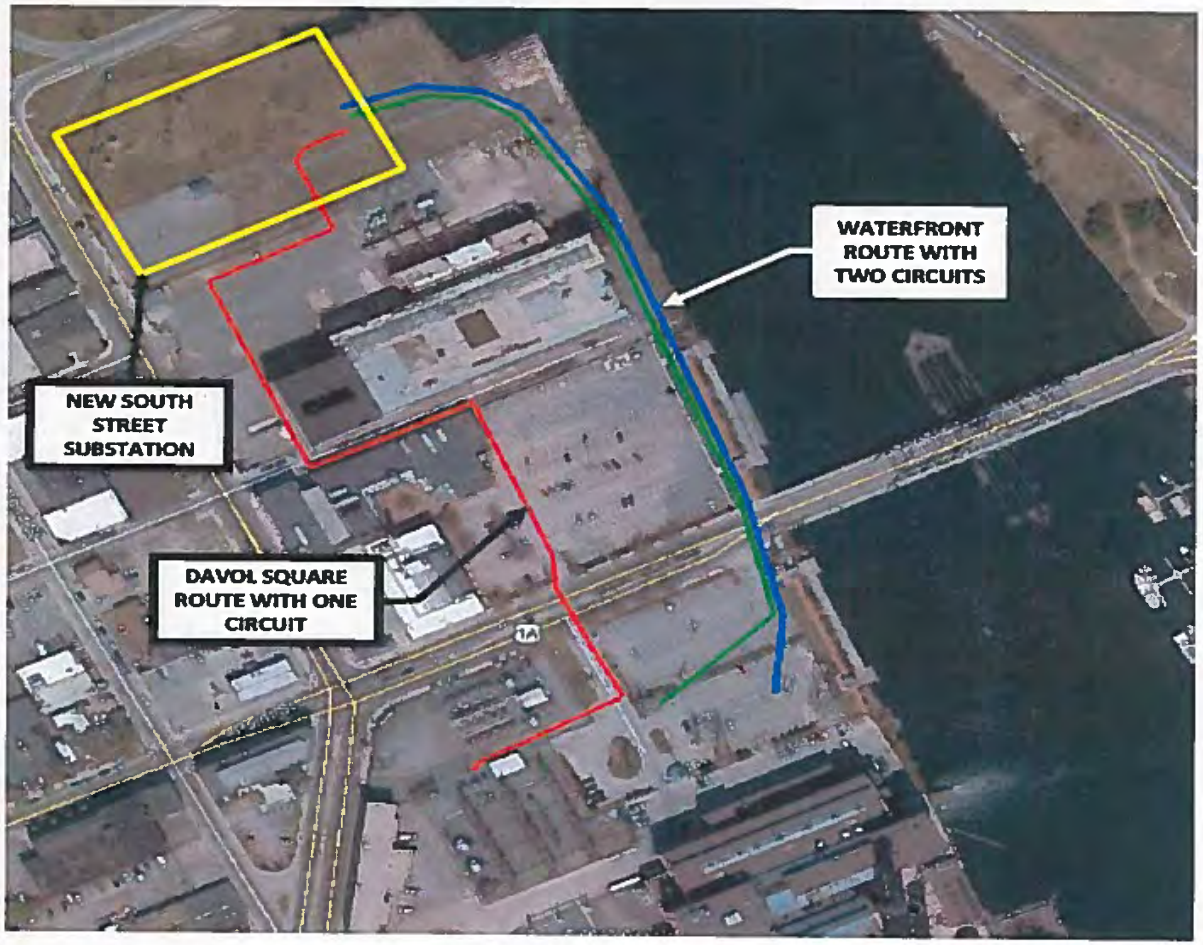
4.2.7 Proposed South Street Substation 115 kV Supply Cable Routes



4.3 NPV Summary (if applicable) - Not Applicable

4.4 Customer Outreach Plan (if applicable)

Customer outreach has begun and is ongoing for the South Street project. A working relationship has been established between the National Grid project team for the South Street project and CV Properties, the developer of the South Street Landing project. Environmental permitting efforts are being coordinated.

Additional customer outreach is planned for other stakeholders, including other abutters and City officials.

From: Flynn, Janice
To: Antunes, Nelson; Galgano, Robert; Bob Galgano
Cc:
Subject: RE: USSC-14-195 v2 South Street Sub

Nelson

I need to get these projects updated in PPL before we run our monthly reports therefore; I am going to apply the $74.500 to the projects as shown below:

Thanks
Janice

	C051212	C051213	C055584	C055585	C055586	C055623	Totals
Capex:	$27.738	$11.405	$23.274	$ 6.347	$ 2.711	$ 0.000	$71.475
Opex:	$ 0.010	$ 0.010	$ 0.000	$ 0.005	$ 0.000	$ 0.000	$ 0.025
Rem:	$ 0.000	$ 0.000	$ 0.000	$ 0.419	$ 0.000	$ 2.581	$ 3.000
Totals	$27.748	$11.415	$23.274	$ 6.771	$ 2.711	$ 2.581	$74.500

From: Antunes, Nelson
Sent: Tuesday, July 21, 2015 12:26 PM
To: Flynn, Janice; Galgano, Robert; Bob Galgano
Subject: RE: USSC-14-195 v2 South Street Sub

Hi Janice,
My appologies for the delay. I have a couple of meetings this afternoon and am working on a few open items and will try to get that information to you by tomorrow
Regards,

Nelson M. Antunes, MS, PMP.
Lead Project Manager

C051385

Central Falls Sub Relief

5360-Narragansett Electric and Gas
Project Revision Detail Report

Fund Project Number:	C051385	**USSC #:**	USSC-17-295
Revision:	2	**Budget Version:**	
Project Title:	Central Falls Sub Relief		
Project Description:	This project is required to relieve an overloaded transformer at Central Falls substation.		

Project Status:	open		
Responsible Person:	MORAN, HEATHER	**Initiator:**	Vaz, Jack P
Spending Rationale:	System Capacity & Performance	**Funding Type:**	P Electric Distribution Line RI
Budget Class:	Load Relief		
Capital by Category:			
Program Code:			
Project Risk Score:	41	**Project Complexity Score:**	13

Project Schedule / Expenditures

Revision Status:	Approved		
Est Start Date:	8/26/2013	**Est Complete Date:**	7/15/2018
Est In-Service Date:	4/15/2018		
TTD Actuals:	$884,905	**As Of:**	10/3/2017

Cost Breakdown	Capital	Expense	Removal	Total	Credits
	$662,000	$169,000	$319,000	$1,150,000	$0

Justification / Risk Identification:

Central Falls is a 13.8/4.16kV substation with two transformers each supplying two feeders. It serves 3,439 customers with 7.05MW of load in the City of Pawtucket. Until this year, metering at the station has consisted of instantaneous meters, which has resulted in the station and transformer load to be estimated.

In 2013, voltage regulators at this station were replaced to address asset condition concerns. Thermal meters were installed under the voltage regulator project that provided peak thermal reads on the feeders. Based on reads from

Project Scope:

The most economical approach to reduce loading on the Central Falls transformers is to convert load to the area¿s 13.8kV system. These 4.16kV circuits are either installed on the same poles as the 13.8kV distribution circuits or surrounded by the 13.8kV distribution system.

Project Alternatives Considered:

No economical alternative exists to the recommended approach.

Additional Notes:

<Enter data here>

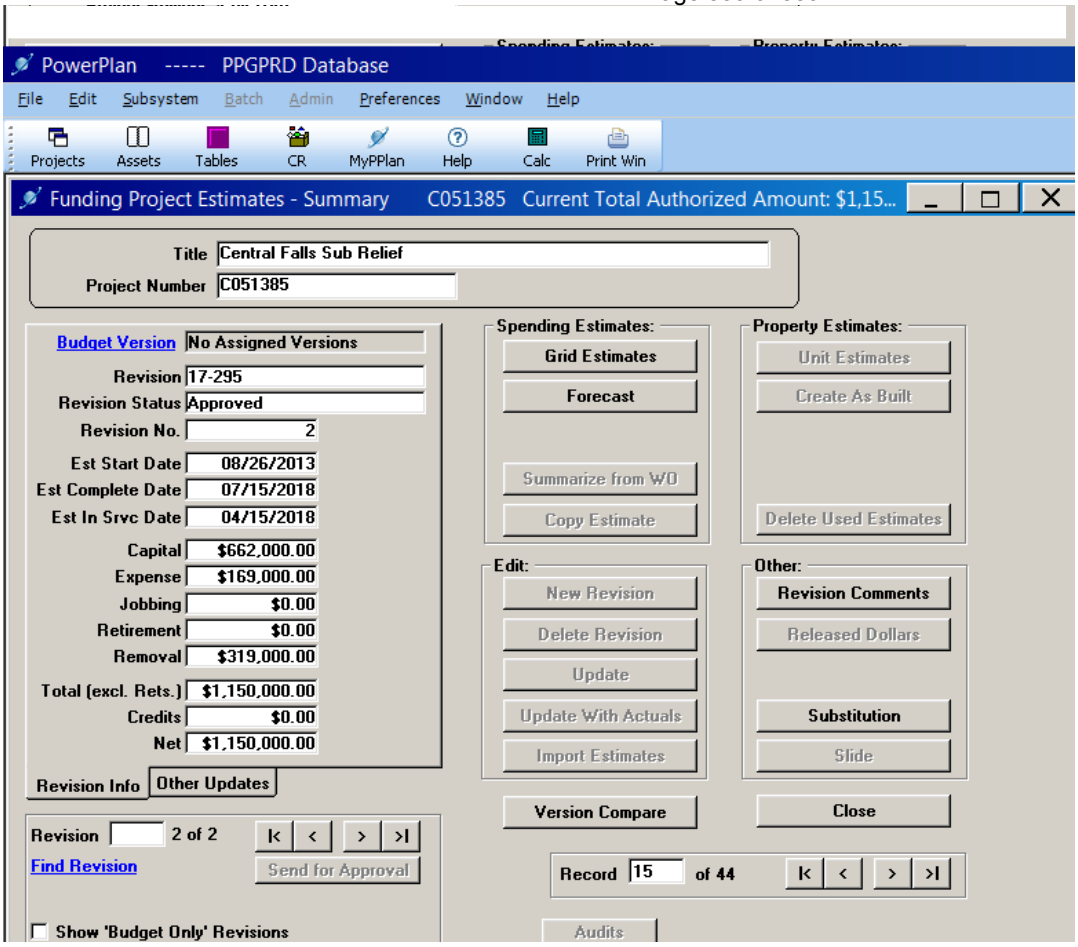
Related Projects:

Project Number: **Project Name:**

Approvals

Line 1:	**Date**	8/18/2017 11:18:20	**Approver**	monted	USSC Approver
Line 2:	**Date**		**Approver**		
Line 3:	**Date**		**Approver**		
Line 4:	**Date**		**Approver**		
Line 5:	**Date**		**Approver**		

*****Project Authorization is for Approved Revision Total Estimated Cost +10% *****


PowerPlan ----- PPGPRD Database
File Edit Subsystem Batch Admin Preferences Window Help
Projects Assets Tables CR MyPPlan Help Calc Print Win
Funding Project Estimates - Summary C051385 Current Total Authorized Amount: $1,15...
Title Central Falls Sub Relief
Project Number C051385
Budget Version No Assigned Versions
Revision 17-295
Revision Status Approved
Revision No. 2
Est Start Date 08/26/2013
Est Complete Date 07/15/2018
Est In Srvc Date 04/15/2018
Capital $662,000.00
Expense $169,000.00
Jobbing $0.00
Retirement $0.00
Removal $319,000.00
Total (excl. Rets.) $1,150,000.00
Credits $0.00
Net $1,150,000.00
Revision Info
Other Updates
Revision 2 of 2
Find Revision
Send for Approval
Show 'Budget Only' Revisions
Spending Estimates:
Grid Estimates
Forecast
Summarize from WO
Copy Estimate
Property Estimates:
Unit Estimates
Create As Built
Delete Used Estimates
Edit:
New Revision
Delete Revision
Update
Update With Actuals
Import Estimates
Other:
Revision Comments
Released Dollars
Substitution
Slide
Version Compare
Close
Record 15 of 44
Audits

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rating ıpany:	The Narragansett Electric Co.	Date of Request:	8/8/17
			Carol Sedewitz VP of Electric Asset Management
ıor:	Heather Moran	Sponsor:	
		r:	Heather Morar

Executive Summary

paper requests the resanction of **C051385** in the amount $**1.150M** with a toler
. 10% for the purposes of full implementation and construction.

*sanction amount is **$1.150** broken down into:*

$0.662M Capex
$0.169M Opex
$0.319M Removal

the originally requested sanction amount of $0.295M

Resanction Details

Project Summary

project is required to relieve an overloaded transformer bank at the Central Fa
tation. This is a 13.8/4.16kV substation with two transformer banks each suppl
eeders. It serves 3,439 customers with 7.05MW of load in the city of Central F
le Island. The North transformer bank serves the 104J5 and 104J7 circuits an
ı transformer bank serves the 104 J1 and 104 J3 feeders. Based on reads fron
ıal meters, it was determined that the loading on the station's North transforme
exceeded summer normal ratings. This project will convert a section of the 10
feeders to the 13.8kV 102W52 feeder out of the Valley Substation. It will also
art a section of the 104J7 feeder to the 13.8kV 107W43 feeder out of the

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ject Number	Project Type (Elect only)	Project Title	Estimate Amount ($M)
C051385	D-Line	Central Falls Sub Relief	1.150
		Total	1.150

Prior Sanctioning History

viously approved sanctions are attached and listed below (Newest to Oldest).

	Governance Body	Sanctioned Amount	Potential Project	Paper Title	Sanction Type	Paper Reference	Tole
				Falls Sub Relief	$1.0M		

er / Under Expenditure Analysis

mmary Analysis ($M)	Capex	Opex	Removal	Total
anction Amount	0.662	0.169	0.319	1.150
st Approval	0.225	0.030	0.040	0.295
nge*	0.437	0.139	0.279	0.855

nge = (Re-sanction – Amount Latest Approval)

2.4 Cost Summary Table

	Project Title	Project Estimate Level (%)		Prior Yrs	Current Planning Horizon Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6 +
			Spend ($M)		2017/18	2018/19	2019 20	2020/21	2021 22	2022/23
	Central Falls Sub Relief	Est Lvl (e.g. + -	CapEx	0 116	0 546	0.000	0.000	0.000	0.000	0.000
			OpEx	0.022	0 147	0.000	0.000	0.000	0.000	0 000

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Business an Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
'18-FY22 arragansett ectric stribution isiness an	⊙ Yes ○ No	⊙ Over ○ Under N/A	.855M

Drivers

Detailed Analysis Table

ollowing table indicates the major key variations that account for the difference een the original sanction amount and the requested resanction amount.

Detail Analysis (M's)	Over/Under Expenditure?	Amount
estimate for construction in location	☒ Over ☐ Under	0.505M
estimate for civil work	☒ Over ☐ Under	0.271M
ition of WR for required oad permit	☒ Over ☐ Under	0.079M

Explanation of Key Variations

riginal estimate did not account for the work to be performed during off-hours due / congestion. This resulting in higher labor and police detail costs. In addition, ional techniques for pole removals in city sidewalks were ineffective in this locatio prompted higher than antipated utilization of our civil crews. Finally, the required ad permit was omitted from the design, resulting in additional costs for the work in cinity of the railroad.

If cost > approved Business Plan how will this be funded?

location of funds have been managed by Resource Planning to meet jurisdictiona etary, statutory, and regulatory requirements.

Resanction Request

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2.8 Key Milestones

Milestone	Target Date: Month/Year
ect Closure	July 2018
[redacted]	[redacted]

2.9 Next Planned Sanction Review

Date (Month/Year)	Purpose of Sanction Review
[redacted]	[redacted]

Resanction Request

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supporters listed have aligned their part of the business to support the prc

De artment	Individual	Res onsibilities
Resource Planning	Daniel Marceau	Endorses Resources, c estimate, schedule, ar Portfolio Alignment
Asset Management	Al Labarre	Endorses scope, desig conformance with desi standards

Reviewers

eviewers have provided feedback on the content/language of the paper

Function	Individual
gulatory	Renee Gurry
sdictional Delegate	Sonny Anand
curement	Art Curran
ntrol Center (CC)	Michael Gallagher

Resanction Request

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APPROVE this paper and the investment of $1.150M and a tolerance of +/-

NOTE that Heather Moran is Project Manager and has the approved fin
delegation.

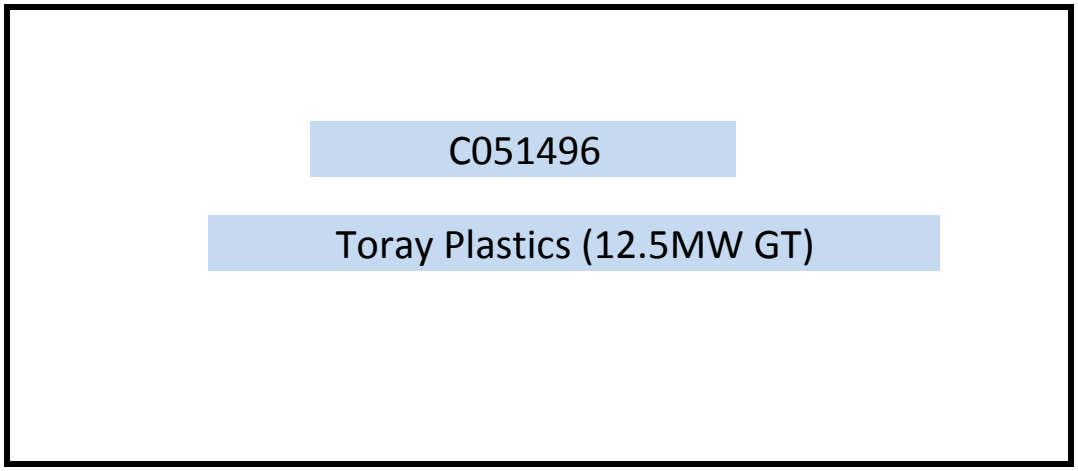
the

ature..... .. . .Date..... ... ...

Christopher Kelly,
Senior Vice President – Electric Process & Engineering 8/15/07

5 *Appendices*

N/A


C051496
Toray Plastics (12.5MW GT)

5360-Narragansett Electric and Gas
Project Revision Detail Report

Fund Project Number:	C051496	**USSC #:**	
Revision:	2	**Budget Version:**	Default
Project Title:	Toray Plastics (12.5MW GT)		
Project Description:	Torray Plastics North Kingstown, RI, 12.5MW Synch Gas Turbine Interconnection. RI-12771251, 50 Belver Avenue, North Kingstown RI		

Project Status:	open		
Responsible Person:	PHILLIPS, MARK	**Initiator:**	George, Caleb
Spending Rationale:	Customer Request/Public Require	**Funding Type:**	P_Electric Distribution Sub RI
Budget Class:	Distributed Generation		
Capital by Category:			
Program Code:			
Project Risk Score:	49	**Project Complexity Score:**	18

Project Schedule / Expenditures

Revision Status:	Approved		
Est Start Date:	11/1/2013	**Est Complete Date:**	8/21/2014
Est In-Service Date:	8/21/2014		
TTD Actuals:	$640,310	**As Of:**	10/3/2017

Cost Breakdown	Capital	Expense	Removal	Total	Credits
	$781,200	$46,500	$102,300	$930,000	($465,400)

Justification / Risk Identification:

Torray Plastics has requested a Distributed Generation interconnection totaling 12,500kW to National Grid¿s EPS. This is a natural gas fired synchronous generator, connected behind an existing primary meter.

Project Scope:

The Interconnection Facilities shall consist of: Install: 2-gang operated disconnect switches, structures, and foundations, associated strain/rigid conductor for disconnect structure, 6" PVC concrete encased ducts to disconnect structures, ground grid, and perimeter fence.; Remove: 2-capacitor banks and foundations, 5 kV conductor and wooden structures, and portion of existing perimeter fence; Transfer: existing service transformers to new structures; Test and commission new devices .

Project Alternatives Considered:

There are no viable alternatives.

Additional Notes:

Re-Sanction from $425K to $930K document attached. Substation crews as well as Distribution OH Line crews had to work a large amount of overtime (including weekend/off-hour due to outage restrictions) to meet customer demands and need date.

There is a small amount of work on the Distribution Line Level. This will be completed under a separate WR#.

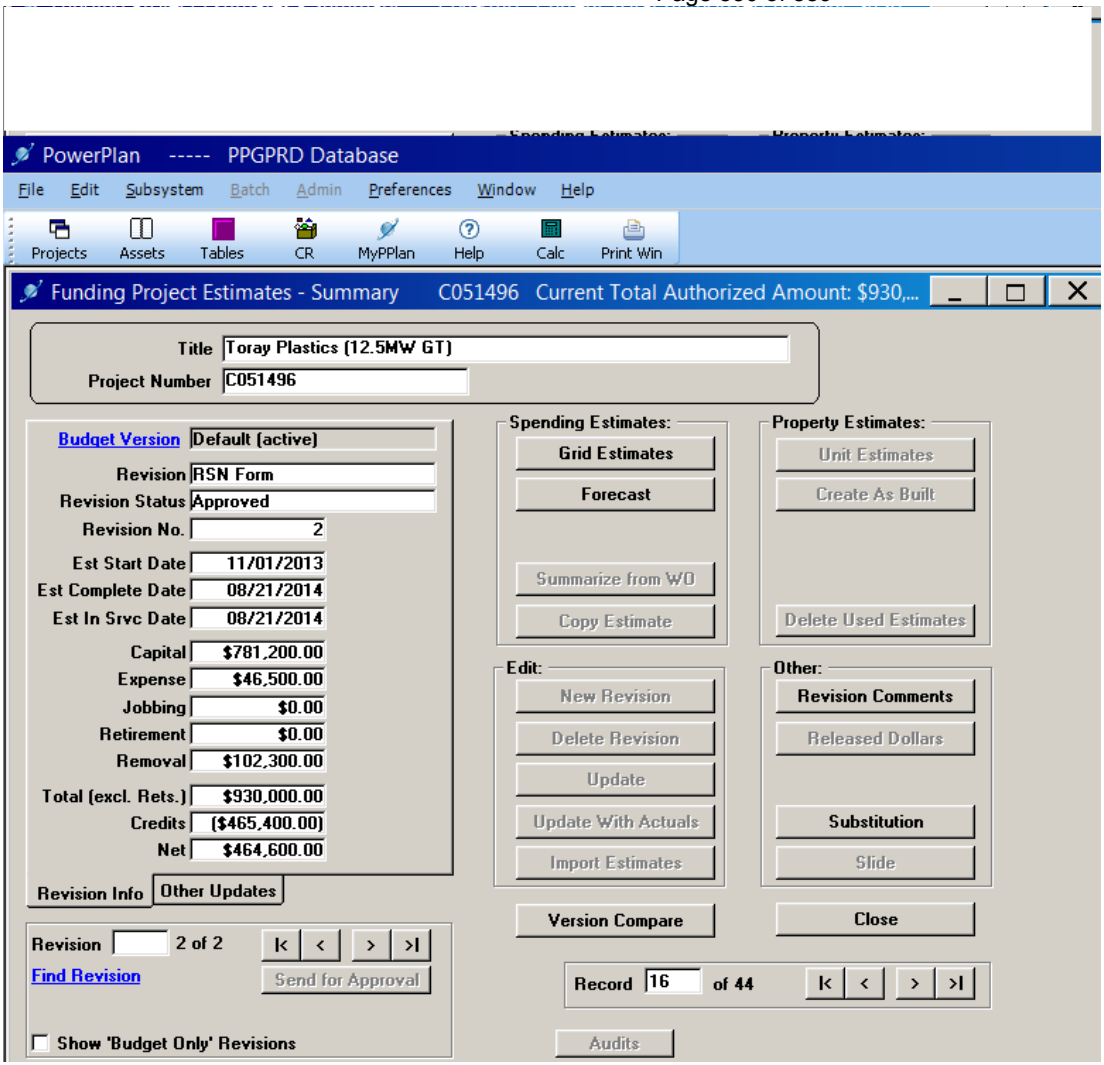
Related Projects:

Project Number:	Project Name:

Approvals

Line 1:	**Date**	8/17/2015 10:37:20	**Approver**	nearyal	DOA - Distribution Lev
Line 2:	**Date**	8/17/2015 11:18:16	**Approver**	Park, Michelle L	DOA - Distribution Lev
Line 3:	**Date**	8/18/2015 08:09:00	**Approver**	Martuscello, Suzan E	DOA - Distribution Lev
Line 4:	**Date**	8/18/2015 15:35:17	**Approver**	Constable, Ryan	DOA - Distribution Lev
Line 5:	**Date**	8/21/2015 09:54:38	**Approver**	LaBarre, Alan T	DOA - Distribution Lev

*****Project Authorization is for Approved Revision Total Estimated Cost +10%*****


PowerPlan ----- PPGPRD Database
File Edit Subsystem Batch Admin Preferences Window Help
Projects Assets Tables CR MyPPlan Help Calc Print Win
Funding Project Estimates - Summary C051496 Current Total Authorized Amount: $930,...
Title Toray Plastics (12.5MW GT)
Project Number C051496
Budget Version Default (active)
Revision RSN Form
Revision Status Approved
Revision No. 2
Est Start Date 11/01/2013
Est Complete Date 08/21/2014
Est In Srvc Date 08/21/2014
Capital $781,200.00
Expense $46,500.00
Jobbing $0.00
Retirement $0.00
Removal $102,300.00
Total (excl. Rets.) $930,000.00
Credits ($465,400.00)
Net $464,600.00
Revision Info
Other Updates
Revision 2 of 2
Find Revision
Send for Approval
Show 'Budget Only' Revisions
Spending Estimates:
Grid Estimates
Forecast
Summarize from WO
Copy Estimate
Property Estimates:
Unit Estimates
Create As Built
Delete Used Estimates
Edit:
New Revision
Delete Revision
Update
Update With Actuals
Import Estimates
Other:
Revision Comments
Released Dollars
Substitution
Slide
Version Compare
Close
Record 16 of 44
Audits

Change in DOA Request Form (Less than Million)

Version 9.0

Note: Fill data in the grey area and email form to **Mario Carlino** and the appropriate IP analyst.
Gas - Tracy Nguyen
Electric - Janice Flynn

*Date:	7/30/2015
*Operating Company:	The Narragansett Electric Co.
*PowerPlant Project Id:	C051496
*Project Name:	Toray Fan Substa. DG - Install Disconnect Switches and Stru
*Project Engineer:	Eric Wiesner
*Project Manager:	Liam Watts

Latest Project Estimate

*Date of Latest Sanction:	9/17/2013

Total	Capex	Opex	Removal
$425,000	$358,000	$20,000	$47,000

Revised Project Estimate

Total	Capex	Opex	Removal
$930,000	$781,200	$46,500	$102,300

Cash Flows

Previous FY	Capex	Opex	Removal
$930,000	$781,200	$46,500	$102,300

Current FY	Capex	Opex	Removal
$0			

FY+1	Capex	Opex	Removal
$0			

FY+2	Capex	Opex	Removal
$0			

Customer Contribution

Reason for Revision

☐	Revised forecast either exceeds or is lower than the Approved Amount - Project Still In Process
	New Project Estimated Completion Date:
☑	Actual Spending either exceeds or is lower than the Approved Amount – Project is Complete

Reason for Increased Spending (Please expand the row height if box doesn't fit)

☐	**Change in Scope (Material, Labor or Other)**

Change in DOA Request Form (Less than Million)

☐	**Resource Allocation (Schedule, Delay, OT, or Contractor)**
☑	**Low / High Estimate**
	Substation crews as well as Distribution OH Line crews had to work a large amount of overtime (including weekend/off-hour due to outage restrictions) to meet customer demands and need date.
☐	**External Forces (Permitting Requirements, Weather, Contractor Issues, etc)**

In-service Dates

*Original In-service Date:	6/1/2014
*Revised In-service Date:	8/21/2014

C051625

South Street Transformer Spare.

5360-Narragansett Electric and Gas
Project Revision Detail Report

Fund Project Number:	C051625	**USSC #:**	
Revision:	5	**Budget Version:**	Default
Project Title:	South Street Transformer Spare.		
Project Description:	This is a project to purchase a transfomer spare for the South Street and Franklin square transformers. This is a 23 kV - 11.5 kV, 12.5 MVA.		

Project Status:	Closed		
Responsible Person:	SHI, LIN	**Initiator:**	Duarte, Eileen M
Spending Rationale:	System Capacity & Performance	**Funding Type:**	P Electric Distribution Sub RI
Budget Class:	Reliability		
Capital by Category:			
Program Code:			
Project Risk Score:	45	**Project Complexity Score:**	11

Project Schedule / Expenditures

Revision Status:	Approved		
Est Start Date:	9/16/2013	**Est Complete Date:**	7/14/2014
Est In-Service Date:	7/14/2014		
TTD Actuals:	$383,188	**As Of:**	10/3/2017

Cost Breakdown	Capital	Expense	Removal	Total	Credits
	$389,580	$0	$420	$390,000	$0

Justification / Risk Identification:

This transformer spare will provide coverage for 6 transformers at two substation locations - South Street and Franklin Square substations. The primary reason for the purchase of this spare is due to the poor condition of transformer #2216 at South Street. This transformer is in poor condition with no viable spare or mobile substation. The oil is contaminated and has a low breakdown voltage. Due to the age of the unit (73) it is difficult to retrofill. There are elevated combustible gasses and the insulation is at the end of life. The transformer is in need of replacement, it is on the five year replacement list and watch list. However, since the station will be retired as a result

Project Scope:

Purchase a 23 kv - 11.5 kV, 12.5 MVA Delta-Delta transformer to be stored at South Street Substation.

Project Alternatives Considered:

Purchase and replace the transformer. This is not recommended due to the proposed eventual retirement of this station as a result of the Providence Study.

Additional Notes:

The fiscal year 2014 budgeted dollars are in the capital plan under Project Funding No. C026058.
Re-sanction from $335K to $390K from Lin Shi. The approved full DOA $335,000 only accounts for transformer purchase price $325,000 and $10,000 labor cost. It was too low and didn't consider (1) the sales tax for major equipment (Transformer, around 7% tax rate), (2) the minor material purchase and installation $4000 (Furnish & install 4 sided chain link), and (3) sufficiant internal labor cost/transportation. The new estimate for total project cost is

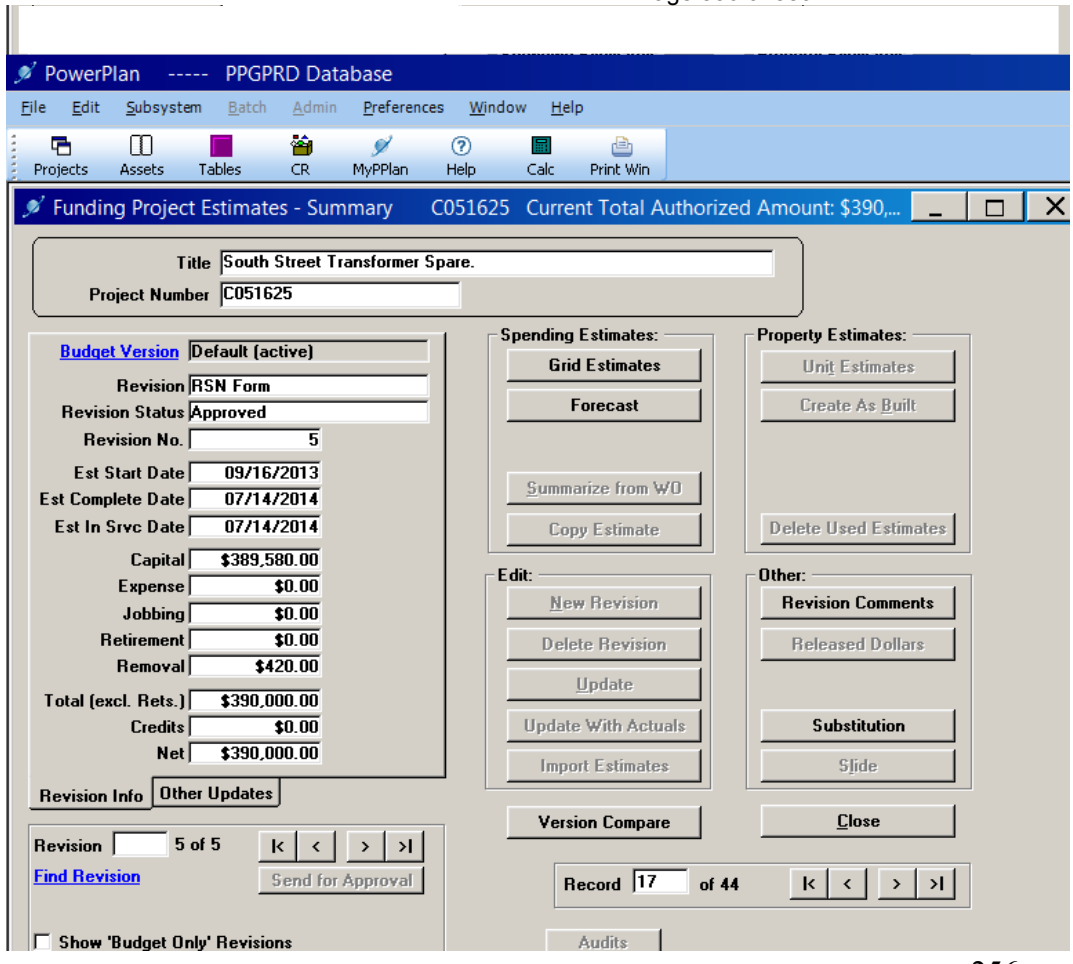
Related Projects:

Project Number:	Project Name:

Approvals

Line 1:	**Date**	7/23/2014 11:29:45	**Approver**	nearyal	DOA - Distribution Lev
Line 2:	**Date**	7/23/2014 13:42:28	**Approver**	Diconza, Glen L	DOA - Distribution Lev
Line 3:	**Date**	7/24/2014 18:01:35	**Approver**	Gavin, John E	DOA - Distribution Lev
Line 4:	**Date**	8/11/2014 12:34:30	**Approver**	Constable, Ryan	DOA - Distribution Lev
Line 5:	**Date**	8/14/2014 17:16:53	**Approver**	LaBarre, Alan T	DOA - Distribution Lev

*****Project Authorization is for Approved Revision Total Estimated Cost +10 % *****


PowerPlan ----- PPGPRD Database
File Edit Subsystem Batch Admin Preferences Window Help
Projects Assets Tables CR MyPPlan Help Calc Print Win
Funding Project Estimates - Summary C051625 Current Total Authorized Amount: $390,...
Title South Street Transformer Spare.
Project Number C051625
Budget Version Default (active)
Revision RSN Form
Revision Status Approved
Revision No. 5
Est Start Date 09/16/2013
Est Complete Date 07/14/2014
Est In Srvc Date 07/14/2014
Capital $389,580.00
Expense $0.00
Jobbing $0.00
Retirement $0.00
Removal $420.00
Total (excl. Rets.) $390,000.00
Credits $0.00
Net $390,000.00
Revision Info
Other Updates
Revision 5 of 5
Find Revision
Send for Approval
Show 'Budget Only' Revisions
Spending Estimates:
Grid Estimates
Forecast
Summarize from WO
Copy Estimate
Property Estimates:
Unit Estimates
Create As Built
Delete Used Estimates
Edit:
New Revision
Delete Revision
Update
Update With Actuals
Import Estimates
Other:
Revision Comments
Released Dollars
Substitution
Slide
Version Compare
Close
Record 17 of 44
Audits

Project Sanction/Re-Sanction Form

Version 8.5

Note: Fill data in the grey area and email form to **Mario Carlino** and the appropriate IP analyst.
Gas - Tracy Nguyen
Distribution - Janice Flynn
Transmission - Matt Roby

*Date:	7/14/2014
*Operating Company:	The Narragansett Electric Co.
*PowerPlant Project Id:	C051625
*Project Name:	South St. and Franklin Square Spare Transfermoer
Project Engineer:	Dan Falla
Project Manager:	Lin Shi

Original Project Estimate

*Date of Original Sanction:	9/24/2013

Total	Capex	Opex	Removal
$335,000	$335,000	$0	$0

Revised Project Estimate

Total	Capex	Opex	Removal
$390,000	$389,580	$0	$420

Cash Flows

Previous FY	Capex	Opex	Removal
$308,958	$308,538	$0	$420

Current FY	Capex	Opex	Removal
$81,042	$81,042	$0	$0

FY+1	Capex	Opex	Removal
$0	$0	$0	$0

FY+2	Capex	Opex	Removal
$0	$0	$0	$0

Customer Contribution

Reason for Revision

☑	Revised forecast either exceeds or is lower than the Approved Amount - Project Still In Process	
	New Project Estimated Completion Date:	7/14/2014

☐	Actual Spending either exceeds or is lower than the Approved Amount – Project is Complete

Project Sanction/Re-Sanction Form

Reason for Increased Spending (Please expand the row height if box doesn't fit)

☐	**Change in Scope (Material, Labor or Other)**
☐	**Resource Allocation (Schedule, Delay, OT, or Contractor)**
☑	**Low/High Estimate**
	The approved full DOA $335,000 only accounts for transformer purchase price $325,000 and $10,000 labor cost. It was too low and didn't consider (1) the sales tax for major equipment (Transformer, around 7% tax rate), (2) the minor material purchase and installation $4000 (Furnish & install 4 sided chain link), and (3) sufficiant internal labor cost/transportation. The new estimate for total project cost is $390,000.
☐	**External Forces (Permitting Requirements, Weather, Contractor Issues, etc)**

In-service Dates

*Original In-service Date:	3/31/2014
*Revised In-service Date:	7/10/2014

C051824

Lafayette Sub Transformer Replaceme

5360-Narragansett Electric and Gas
Project Revision Detail Report

Fund Project Number:	C051824	**USSC #:**	USSC-14-223 v2
Revision:	5	**Budget Version:**	Default
Project Title:	Lafayette Sub Transformer Replaceme		
Project Description:	This is a project to replace the No. 1, 3 phase transformer at Lafayette substation due to asset condition issues.		

Project Status:	open		
Responsible Person:	HURLEY, KATHLEEN	**Initiator:**	Duarte, Eileen M
Spending Rationale:	Asset Condition	**Funding Type:**	P Electric Distribution Sub RI
Budget Class:	Asset Replacement		
Capital by Category:			
Program Code:			
Project Risk Score:	35	**Project Complexity Score:**	19

Project Schedule / Expenditures

Revision Status:	Approved		
Est Start Date:	9/25/2013	**Est Complete Date:**	4/1/2018
Est In-Service Date:	4/1/2018		
TTD Actuals:	$996,378	**As Of:**	10/3/2017

Cost Breakdown	Capital	Expense	Removal	Total	Credits
	$1,900,000	$1,000	$49,000	$1,950,000	$0

Justification / Risk Identification:

This is a project to replace the No. 1, 3 phase transformer Equipment ID #20837 at Lafayette Substation due to asset condition. The existing transformer is a 34.5 delta 0 degrees - 12.47Y/7.2 kV wye 30 degrees, 5/6.25 MVA. The transformer is wet and contaminated. The Furan Analysis indicates that the insulation system is deteriorated and near its end of life. The transfomer is 56 years of age. This unit has been on our transformer replacement list and is being proactively replaced due to a high liklihood of failure.

Project Scope:

Replace the No. 1, 3 phase transformer Equipment No. 20837 with the same voltage and configuration rating but with a larger capacity. Replace with a 34.5 kv delta - 12.47/7.2 wye 7.5/9/375 MVA transformer.

Due to loading issues and the voltage regulators being the limiting element on the feeder, add an option to this CER to replace the 30F1 A, B and C phase regulators presently rated at 250 kVA with regulators rated 333 kVA.

Project Alternatives Considered:

<Enter data here>

Additional Notes:

The dollars are budgeted under Project Funding Number C025803.

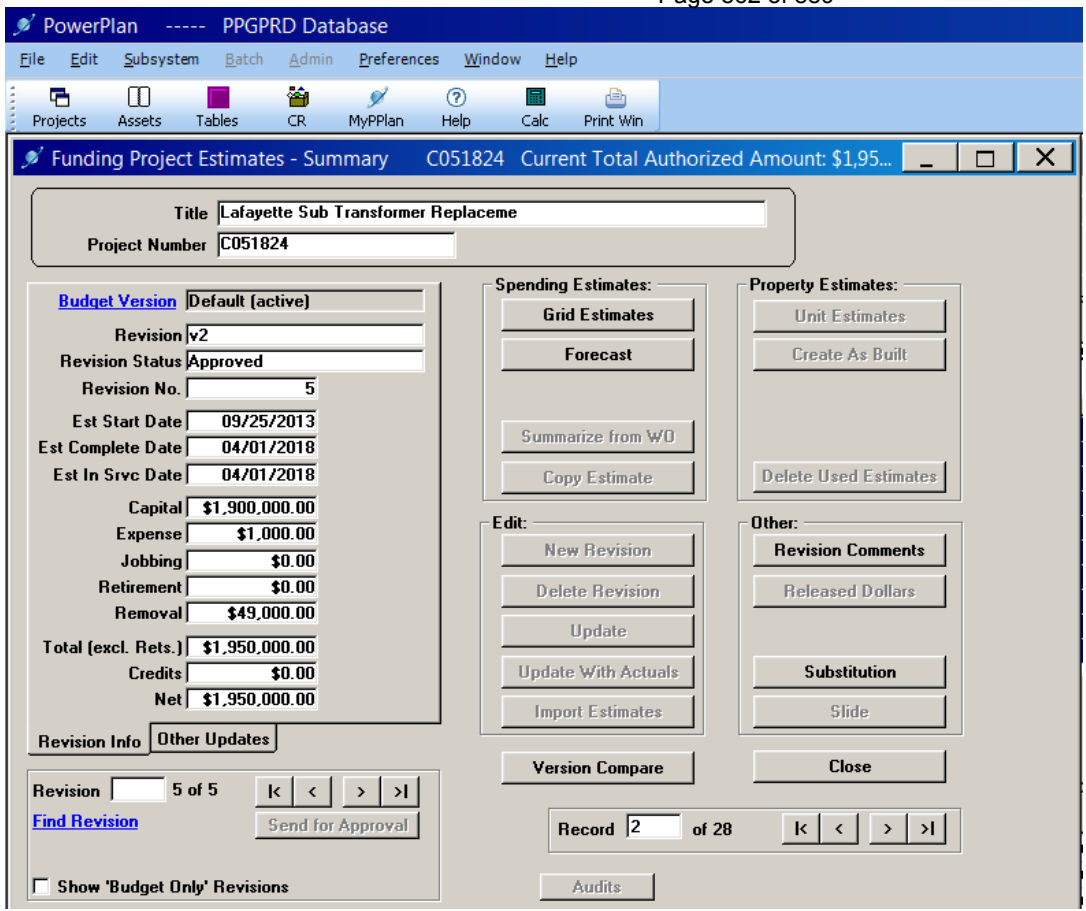
Related Projects:

Project Number: **Project Name:**

Approvals

Line 1:	**Date**	1/7/2016 11:44:03	**Approver**	carlim	USSC Approver
Line 2:	**Date**		**Approver**		
Line 3:	**Date**		**Approver**		
Line 4:	**Date**		**Approver**		
Line 5:	**Date**		**Approver**		

*****Project Authorization is for Approved Revision Total Estimated Cost +10%*****


PowerPlan ----- PPGPRD Database
File Edit Subsystem Batch Admin Preferences Window Help
Projects Assets Tables CR MyPPlan Help Calc Print Win
Funding Project Estimates - Summary C051824 Current Total Authorized Amount: $1,95...
Title Lafayette Sub Transformer Replaceme
Project Number C051824
Budget Version Default (active)
Revision v2
Revision Status Approved
Revision No. 5
Est Start Date 09/25/2013
Est Complete Date 04/01/2018
Est In Srvc Date 04/01/2018
Capital $1,900,000.00
Expense $1,000.00
Jobbing $0.00
Retirement $0.00
Removal $49,000.00
Total (excl. Rets.) $1,950,000.00
Credits $0.00
Net $1,950,000.00
Revision Info
Other Updates
Revision 5 of 5
Find Revision
Send for Approval
Show 'Budget Only' Revisions
Spending Estimates:
Grid Estimates
Forecast
Summarize from WO
Copy Estimate
Property Estimates:
Unit Estimates
Create As Built
Delete Used Estimates
Edit:
New Revision
Delete Revision
Update
Update With Actuals
Import Estimates
Other:
Revision Comments
Released Dollars
Substitution
Slide
Version Compare
Close
Record 2 of 28
Audits

Short Form Sanction Paper- Instructions

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Title:	Lafayette Transformer Replacement	**Sanction Paper #:**	USSC-14-223V2
Project #:	C051824	**Sanction Type:**	Partial Sanction
Operating Company:	The Narragansett Electric Co.	**Date of Request:**	January 5, 2016
Author:	Bradley Wheeler	**Sponsor:**	John Gavin, Vice President Electric Asset Management
Utility Service:	Electricity T&D	**Project Manager:**	Bradley Wheeler

1 Executive Summary

1.1 Sanctioning Summary

This paper requests partial sanction of C051824 in the amount $1.950M with a tolerance of +/- 10% for the purposes of Final Engineering, Long Lead Materials, and Preliminary Construction Activities.

This sanction amount is $1.950M broken down into:

$1.900 Capex
$0.000 Opex
$0.050 Removal

NOTE the potential investment of $2.348M with a tolerance of +/-25%, contingent upon submittal and approval of a Project Sanction paper following completion of Final Engineering, Long Lead Materials, and Preliminary Construction Activities.

1.2 Project Summary

This is a project to replace the existing 34.5 - 12.47/7.2 kV, 5/6.25 MVA No. 1 transformer, Equipment ID #20837, at Lafayette #30 Substation in North Kingston, Rhode Island due to asset condition issues. In addition, the motor operated disconnect switches will be replaced due to condition issues, and the project will include the replacement of the associated wood pole box structure with our standard aluminum pole box structure. Lastly, EMS will be expanded to provide status, control and monitoring.

2 Project Detail

2.1 Background

Lafayette Substation #30 is located in North Kingston, Rhode Island. Presently, there are two feeders out of this station serving approximately 3,600 customers. The existing No.1 transformer is a 34.5 - 12.47Y/7.2 kV delta-wye, 5/6.25 MVA unit that has condition issues. Recent tests indicate that the unit is wet and contaminated. The Furan Analysis, which detects cellulose by-products in the oil, reveals that the insulation system is deteriorated and near its end of useful life. The transformer is 56 years of age, and the unit has been on our Transformer Replacement and Watch Lists. The transformer is being proactively replaced due to a high likelihood of failure. In addition, the motor operated air break switches, No. 301 and 302, are in need of replacement. In 2010, the live parts of the motor operated air-break switches were replaced with load break components due to a switch failure. Since then, Substation O&M have been called approximately twelve times due to the misalignment of the blades resulting in the switches not opening or closing fully. In February 2014, the 301 switch failed to open to isolate a fault and consequently the 302 closed in on the fault causing a station outage that impacted 4,809 customers. It is presumed that the operating mechanisms do not appropriately match-up with the larger load break components.

2.2 Drivers

The primary driver for this project is asset condition. The No 1 transformer at Lafayette #30 Substation is in poor condition due to a wet, contaminated and deteriorated insulation system. This is a proactive approach to address an existing condition issue in an effort to maintain reliability and improve our infrastructure. This project is part of the Transformer Substation Strategy, and is in-line with our transformer asset replacements.

2.3 Project Description

Transformer No. 1 rated 34.5 kV – 12.47/7.2 kV delta-wye, 5/6.25 MVA will be replaced with a standard unit rated 34.5 kV – 12.47 kV delta-wye, 7.5 /9.375 MVA. The No.1 and 2 transformer primary 34.5 kV air break switches will be replaced with 34.5 kV reclosers, and the existing fuses will be replaced with 34.5 kV disconnects. The 4 pole wooden box structure will be replaced with a 4 pole aluminum box structure due to the poor condition of the wooden poles. The two 34.5 kV motor operated load break switches, equipment position 301 and 302, will be replaced with two new 34.5 kV motor operated load break switches. This will include the motor operator, outdoor yard AC panel, and the transfer scheme control cabinet. One 34.5 kV gang-operated manual disconnect switch will be installed.

The relay protection for the new transformer and recloser will be upgraded on transformer No.1, and the relay recloser protection scheme will be upgraded on

transformer No.2. The existing RTU will expand EMS to provide remote status, control and monitoring of all switching devices, transformers, voltage regulation and battery systems. Alarming will include transformer low oil; transformer, circuit breaker, relay and battery system trouble. Monitoring will include voltage and current for all three phases and neutral, MW, MVAR, and MVA. Control will include trip and close on all switching devices; reclose on/off on circuit breakers; ground relay control on feeders for switching, and control of voltage regulation.

In order to perform this work, Feeders 30F1 and 30F2, and the 34.5 kV bus will require an outage. It is suggested that this work be performed during off peak loading, and will be further evaluated by the regional control center.

The existing and proposed single-line diagrams along with the proposed plan view can be found in the Appendix.

2.4 Benefits

This project will maintain reliability in the area by eliminating the asset condition issues associated with the deteriorated and contaminated transformer insulation system and the miss-alignment issues with the motor operated load break switches at the Lafayette Substation. Upgrading the capacity of the No. 1 transformer will improve capacity requirements and allow for future growth in the area. By expanding EMS, this will improve remote access and control to the Regional Control Center and improve incident response recovery. EMS Expansion is in line with the RTU Installation and EMS Expansion Strategy.

2.5 Business & Customer Issues

There are no significant business issues beyond what has been described elsewhere.

2.6 Alternatives

Alternative 1: Replace T1, Regulators and Implement Breaker and a Half Design
Alternative 1 recommends the replacement of the existing No.1 transformer to a larger unit, replacement of the No. 1 and 2 primary air-break switches and fuses with 34.5 kV reclosers and disconnects, and the re-configuration of the structure to a breaker and a half design. This alternative is not recommended because based upon the rating of the transformers, a breaker and a half design is not standard; the station is not large enough, and the 34.5 kV structure would require re-alignment and must be moved.

2.7 Investment Recovery

Investment recovery will be through standard rate recovery mechanisms.

2.7.1 Customer Impact

This project results in an indicative first full year revenue requirement when the asset is placed in service equal to approximately $0.445M. This is indicative only. The actual revenue requirement will differ, depending upon the timing of the next rate case and/or the timing of the next filing in which the project is included in rate base.

3 Related Projects, Scoring, Budgets

3.1 Summary of Projects

Project Number	Project Type (Elec only)	Project Title	Estimate Amount ($M)
C051824	D-Sub	Lafayette Transformer Replacement	2.348
		Total	2.348

3.2 Associated Projects

N/A

3.3 Prior Sanctioning History

Date	Governance Body	Sanctioned Amount	Paper Title	Sanction Type
9/2/14	USSC	$514,000	Lafayette Transformer Replacement	Partial
9/26/13	Power Plant	$311,200	Lafayette Sub Transformer Replacement	Partial
2/6/13	DCIG	N/A	Distribution Substation Transformer Strategy – DCIG1009S183	Strategy
10/1/10	DCIG	N/A	Substation RTU Installation Strategy – DCIG1010S317	Strategy

3.4 Category

Category	Reference to Mandate, Policy, or NPV Assumptions

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○ Mandatory ◉ Policy- Driven ○ Justified NPV	Transformer Asset Replacement Program EMS Expansion/RTU Installation Program

3.5 Asset Management Risk Score

Asset Management Risk Score: 35

Primary Risk Score Driver: (Policy Driven Projects Only)

◉ Reliability ○ Environment ○ Health & Safety ○ Not Policy Driven

3.6 Complexity Level

○ High Complexity ◉ Medium Complexity ○ Low Complexity ○ N/A

Complexity Score: 19

3.7 Next Planned Sanction Review

Date (Month/Year)	Purpose of Sanction Review
April - 2017	Project Sanction

4 Financial

4.1 Business Plan

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
New England Distribution FY16 – FY20	◉ Yes ○ No	◉ Over ○ Under ○ NA	$0.612M

4.1.1 If cost > approved Business Plan how will this be funded?

Re-allocation of funds within the portfolio will be managed by Resource Planning to meet jurisdictional budgetary, statutory and regulatory requirements.

4.2 CIAC / Reimbursement

N/A

4.3 Cost Summary Table

					Current Planning Horizon ($M)						
					Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
Project Number	Project Title	Project Estimate Level (%)	Spend	Prior Yrs	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
C051824	Lafayette Transformer Replacement	+/- 25%	CapEx	0.356	0.152	0.209	1.516	-	-	-	2.233
			OpEx	0.001	-	-	-	-	-	-	0.001
			Removal	-	-	-	0.114	-	-	-	0.114
			Total	0.357	0.152	0.209	1.630	-	-	-	2.348

4.4 Project Budget Summary Table

Project Costs per Business Plan

		Current Planning Horizon ($M)						
	Prior Yrs	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	(Actual)	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
CapEx	0.356	0.475	0.850	0.000	0.000	0.000	0.000	1.681
OpEx	0.001	0.010	0.017	0.000	0.000	0.000	0.000	0.028
Removal	0.000	0.010	0.017	0.000	0.000	0.000	0.000	0.027
Total Cost in Bus. Plan	0.357	0.495	0.884	0.000	0.000	0.000	0.000	1.736

Variance (Business Plan-Project Estimate)

		Current Planning Horizon ($M)						
	Prior Yrs	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
$M	(Actual)	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
CapEx	0.000	0.323	0.641	(1.516)	0.000	0.000	0.000	(0.552)
OpEx	0.000	0.010	0.017	0.000	0.000	0.000	0.000	0.027
Removal	0.000	0.010	0.017	(0.114)	0.000	0.000	0.000	(0.087)
Total Cost in Bus. Plan	0.000	0.343	0.675	(1.630)	0.000	0.000	0.000	(0.612)

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5 Key Milestones

Milestone	Target Date: (Month/Year)
Initial Partial Sanction Approval	September 2014
Preliminary Engineering Complete	August 2015
Partial Sanction Approval	January 2016
Final Engineering Design Complete	September 2016
Project Sanction	April 2017
Construction Start	July 2017
Construction Complete	January 2018
Project Closure Report	April 2018

6 Statements of Support

6.1.1 Supporters

The supporters listed have aligned their part of the business to support the project.

Role	Name	Responsibilities
Investment Planner	Michelle Park	Endorses relative to 5-year business plan or emergent work
Resource Planning D-Sub	Mark Phillips	Endorses resources, cost, schedule and portfolio alignment
Asset Management/Planning	Alan Labarre	Endorses scope, cost, and schedule with the companys goals, strategies, and objectives
Engineering and Design	Susan Martuscello	Endorses scope, design, design standard
Engineering and Design	Leonard Swanson	Endorses scope, design, design standard
Project Management	Andrew Schneller	Endorses resource, cost, schedule

6.1.2 Reviewers

The reviewers have provided feedback on the content/language of the paper.

Reviewer List	Name
Finance	Keith Fowler
Finance	Philip Horowitz
Regulatory	Peter Zschokke
Jurisdictional Delegates	Jim Patterson
Procurement	Art Curran
Control Centers	Michael Gallagher

6.1.3 List References

N/A

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7 ***Decisions***

I:

(a) APPROVE the investment of **$1.950M** and a tolerance of +/- 10% for Final Engineering, Long Lead Materials, and Preliminary Construction Activities.

(b) NOTE the potential investment of **$2.348M** and a tolerance of +/-25%, contingent upon submittal and approval of a Project Sanction paper following completion of final engineering and design.

(c) NOTE that Bradley Wheeler is the Project Manager and has the approved financial delegation to undertake the activities stated in (a).

Signature.....Date.....1/7/16.

Executive Sponsor – Marie Jordan, SVP Electric Process & Engineering

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8 Other Appendices

8.1 Sanction Request Breakdown by Project

$M	C051824
CapEx	1.900
OpEx	0.000
Removal	0.050
Total	1.950

8.2 Figures

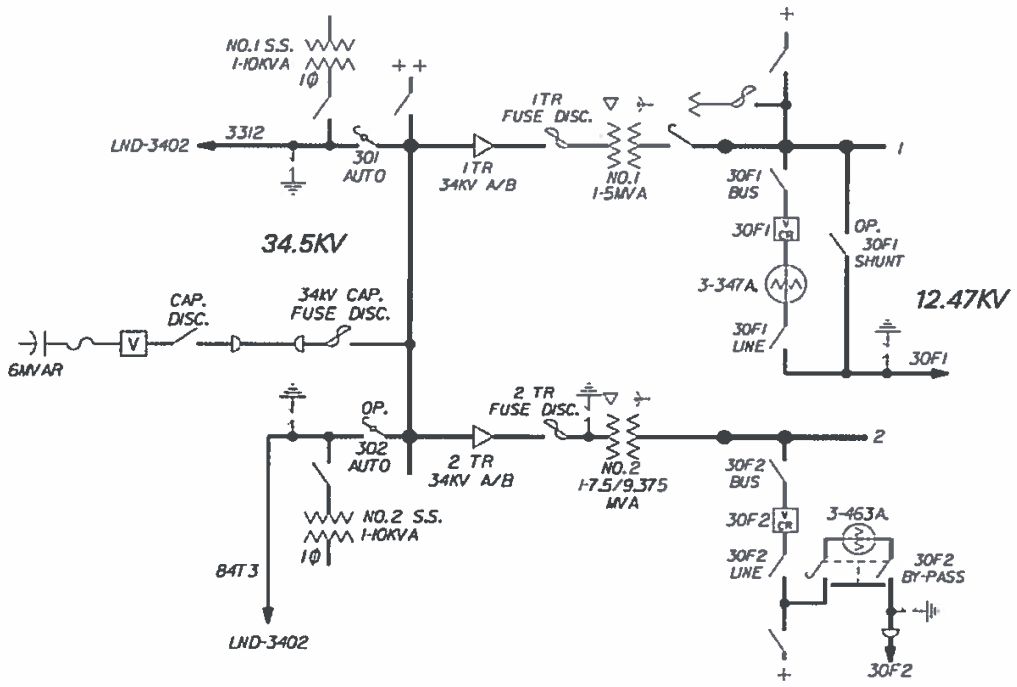

Figure 1. Existing One-line Drawing of Lafayette #30 Substation

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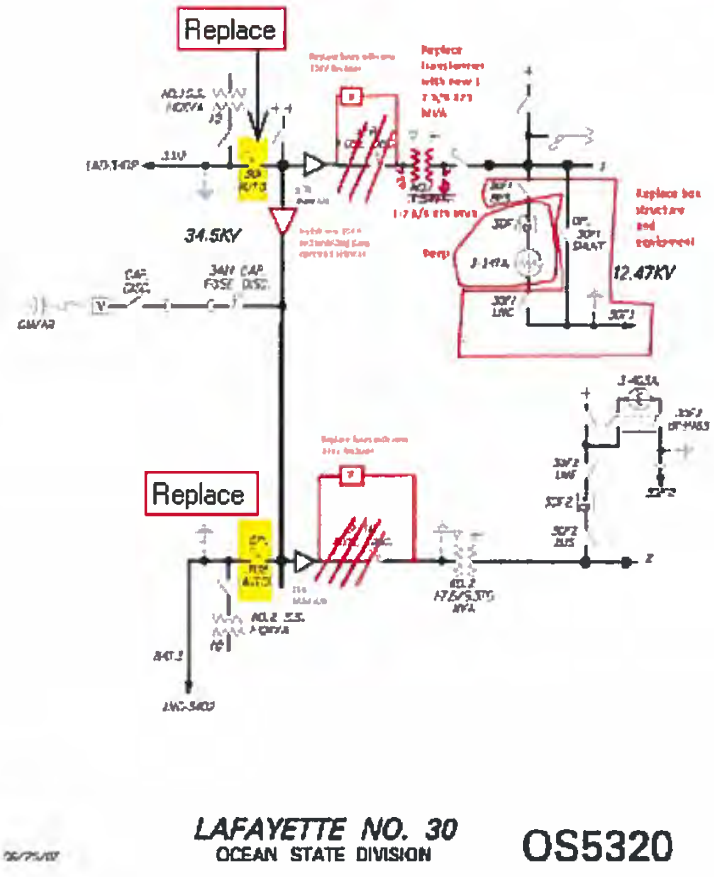


Figure 2. Proposed One-line Diagram for Lafayette #30 Substation

C052686

Prov RI Survey/Repl UG sec. cables

5360-Narragansett Electric and Gas
Project Revision Detail Report

Fund Project Number:	C052686	**USSC #:**	
Revision:	3	**Budget Version:**	DEFAULT
Project Title:	Prov RI Survey/Repl UG sec. cables		
Project Description:	Replace radial underground secondary cable in a portion of the Jewelry District area in Providence. Future replacements in the remainder of this area will be covered under the UG cable replacement program.		

Project Status:	Closed		
Responsible Person:	CURLEY, JOSEPH	**Initiator:**	Duffy Jr, John F
Spending Rationale:	Asset Condition	**Funding Type:**	P Electric Distribution Line RI
Budget Class:	Asset Replacement		
Capital by Category:			
Program Code:			
Project Risk Score:	36	**Project Complexity Score:**	14

Project Schedule / Expenditures

Revision Status:	Approved		
Est Start Date:	12/16/2013	**Est Complete Date:**	3/31/2015
Est In-Service Date:	12/31/2014		
TTD Actuals:	$492,913	**As Of:**	10/3/2017

Cost Breakdown	Capital	Expense	Removal	Total	Credits
	$440,000	$50,000	$35,000	$525,000	$0

Justification / Risk Identification:

This project proactively replaces aged radial underground secondary cable in a limited portion of the Jewelry District area of Providence. Replacements in the remainder of the Jewelry District will be covered under the Rhode Island Underground Cable Replacement program beginning in FY16.

Project Scope:

Install approximately 4000 ft of 3-1/C-500 kcmil Cu XLPE 600 V cable and miscellaneous underground equipment. Remove approximately 4000 ft of underground 6000 V cable of various sizes and types. Replace 7 solid manhole covers with slotted/vented covers.

Project Alternatives Considered:

<Enter data here>

Additional Notes:

12/2013 Rev 1 by J. Duffy for budget purposes ($525K).
12/2013 Rev 2 by J. Duffy for eng/design ($50K).
6/17/14 Rev 3 CL for full-spend/construction ($525K).

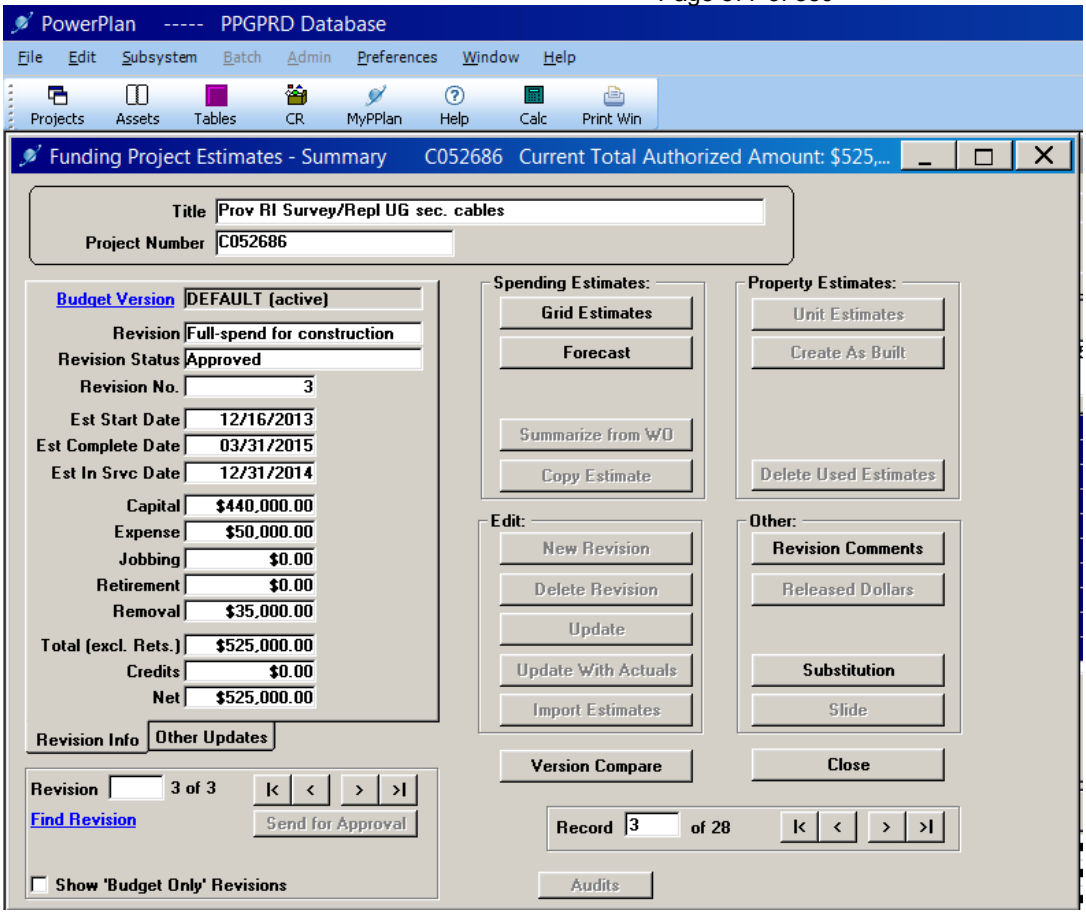
Related Projects:

Project Number: **Project Name:**

Approvals

Line 1:	**Date**	6/17/2014 13:13:39	**Approver**	mokeym	DOA - Distribution Lev
Line 2:	**Date**	6/25/2014 10:37:04	**Approver**	Diconza, Glen L	DOA - Distribution Lev
Line 3:	**Date**	6/25/2014 16:05:17	**Approver**	Constable, Ryan	DOA - Distribution Lev
Line 4:	**Date**	6/26/2014 08:48:15	**Approver**	Pendrake, Robert C	DOA - Distribution Lev
Line 5:	**Date**	6/26/2014 14:28:47	**Approver**	LaBarre, Alan T	DOA - Distribution Lev

*****Project Authorization is for Approved Revision Total Estimated Cost +10%*****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Projects Assets Tables CR MyPPlan Help Calc Print Win
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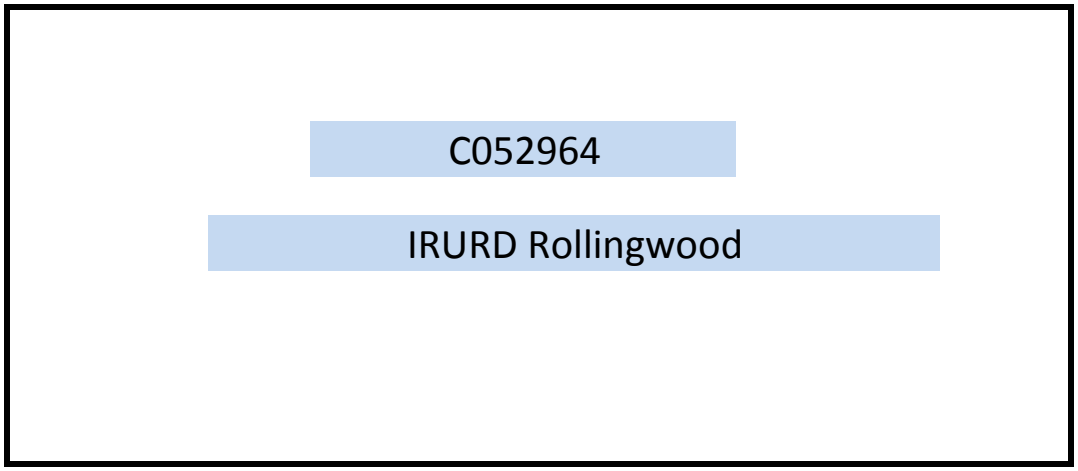
Title Prov RI Survey/Repl UG sec. cables
Project Number C052686
Budget Version DEFAULT (active)
Revision Full-spend for construction
Revision Status Approved
Revision No. 3
Est Start Date 12/16/2013
Est Complete Date 03/31/2015
Est In Srvc Date 12/31/2014
Capital $440,000.00
Expense $50,000.00
Jobbing $0.00
Retirement $0.00
Removal $35,000.00
Total (excl. Rets.) $525,000.00
Credits $0.00
Net $525,000.00
Revision Info
Other Updates
Revision 3 of 3
Find Revision
Send for Approval
Show 'Budget Only' Revisions
Spending Estimates:
Grid Estimates
Forecast
Summarize from WO
Copy Estimate
Property Estimates:
Unit Estimates
Create As Built
Delete Used Estimates
Edit:
New Revision
Delete Revision
Update
Update With Actuals
Import Estimates
Other:
Revision Comments
Released Dollars
Substitution
Slide
Version Compare
Close
Record 3 of 28
Audits


C052964
IRURD Rollingwood

5360-Narragansett Electric and Gas
Project Revision Detail Report

Fund Project Number:	C052964	**USSC #:**	USSC-17-281
Revision:	2	**Budget Version:**	
Project Title:	IRURD Rollingwood		
Project Description:	Inject 10,000' of direct-buried URD cable and replace cable that can not be injected at Rollingwood URD off P.20 Angell Road in Lincoln, RI.		

Project Status:	open		
Responsible Person:	SARAIVA, JOAQUIM	**Initiator:**	Cerulli III, John
Spending Rationale:	Asset Condition	**Funding Type:**	P Electric Distribution Line RI
Budget Class:	Asset Replacement		
Capital by Category:			
Program Code:			
Project Risk Score:	36	**Project Complexity Score:**	17

Project Schedule / Expenditures

Revision Status:	Approved		
Est Start Date:	12/16/2013	**Est Complete Date:**	3/31/2018
Est In-Service Date:	12/31/2017		
TTD Actuals:	$896,805	**As Of:**	10/3/2017

Cost Breakdown	Capital	Expense	Removal	Total	Credits
	$1,212,000	$76,000	$227,000	$1,515,000	$0

Justification / Risk Identification:

This URD was selected for proactive injection at the request of Operations as part of the URD Primary Cable strategy.

Project Scope:

Inject 10,000' of cable and replace cable that can not be injected.

Project Alternatives Considered:

Complete replacement for $2M.

Additional Notes:

<Enter data here>

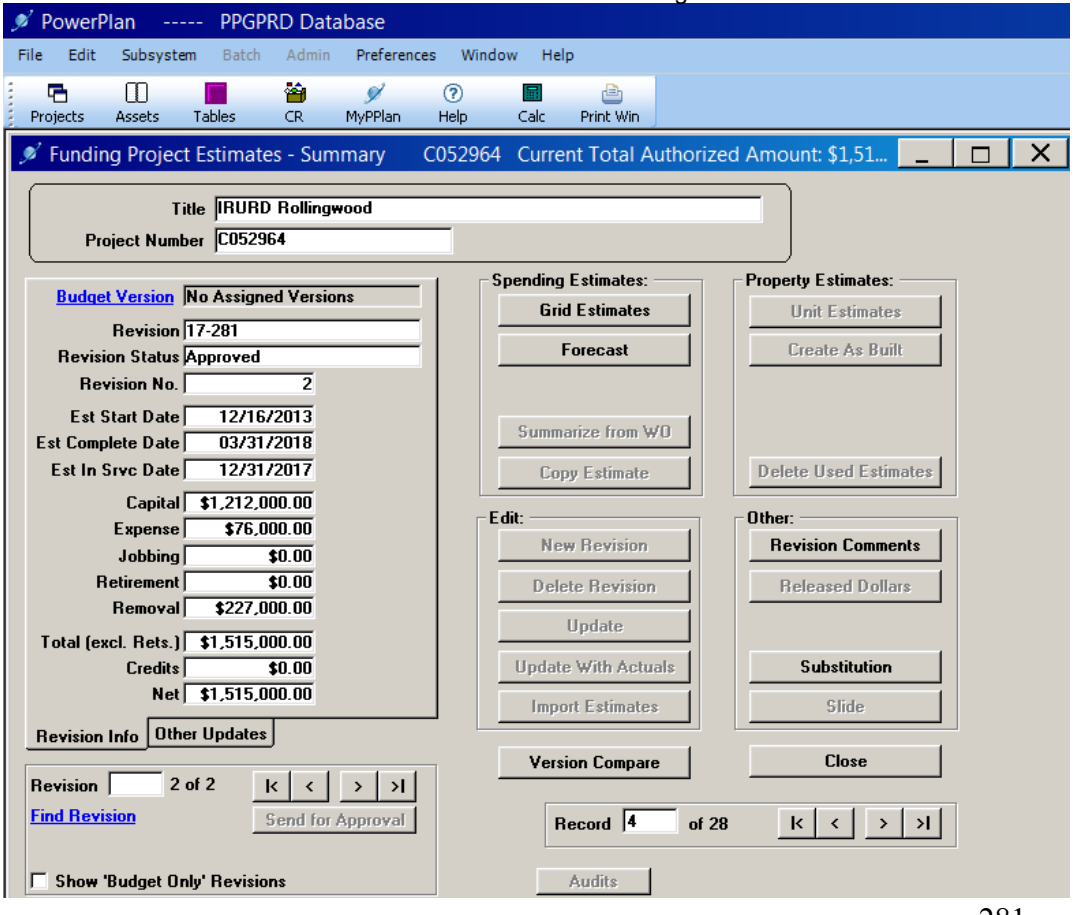
Related Projects:

Project Number: **Project Name:**

Approvals

Line 1:	**Date**	8/2/2017 12:21:42	**Approver**	monted	USSC Approver
Line 2:	**Date**		**Approver**		
Line 3:	**Date**		**Approver**		
Line 4:	**Date**		**Approver**		
Line 5:	**Date**		**Approver**		

*****Project Authorization is for Approved Revision Total Estimated Cost +10% *****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Est Complete Date 03/31/2018
Est In Srvc Date 12/31/2017
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Expense $76,000.00
Jobbing $0.00
Retirement $0.00
Removal $227,000.00
Total (excl. Rets.) $1,515,000.00
Credits $0.00
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Revision Info
Other Updates
Revision 2 of 2
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Send for Approval
Show 'Budget Only' Revisions
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Grid Estimates
Forecast
Summarize from WO
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Property Estimates:
Unit Estimates
Create As Built
Delete Used Estimates
Edit:
New Revision
Delete Revision
Update
Update With Actuals
Import Estimates
Other:
Revision Comments
Released Dollars
Substitution
Slide
Version Compare
Close
Record 4 of 28
Audits

Resanction Request

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Title:	IRURD Rollingwood	**Sanction Paper #:**	USSC-17-281
Project #:	C052964	**Sanction Type:**	Resanction
Operating Company:	Narragansett Electric Co.	**Date of Request:**	7/25/2017
Author:	Jack Saraiva	**Sponsor:**	Carol Sedewitz, VP of Electric Asset Management
Utility Service:	Electricity T&D	**Project Manager:**	Jack Saraiva

1 *Executive Summary*

This paper requests the resanction of C052964 in the amount **$1.515M** with a tolerance of +/- 10% for the purposes of Full Implementation and Construction.

*This sanction amount of **$1.515M** broken down into:*

1.212M Capex
0.076M Opex
0.227M Removal

Note the originally requested sanction amount of $0.800M

2 *Resanction Details*

2.1 Project Summary

This project is rehabilitating the Rollingwood Underground Residential Development (URD) in Lincoln, RI via cable injection and the subsequent replacement of 6,900 feet of direct buried cable with cable in conduit where the cable could not be injected.

2.2 Summary of Projects

Project Number	Project Type (Elect only)	Project Title	Estimate Amount ($M)
C052964	D-Line	IRURD Rollingwood	1.515
		Total	1.515

Resanction Request

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2.3 Prior Sanctioning History

Previously approved sanctions are attached and listed below (Newest to Oldest).

Date	Governance Body	Sanctioned Amount	Potential Project Investment	Paper Title	Sanction Type	Paper Reference Number	Tolerance
1/2/2014	Powerplant DOA (<1M)	$0.800M	$0.800M	IRURD Rollingwoods	Sanction	N/A	+/-10%

Over / Under Expenditure Analysis

Summary Analysis ($M)	Capex	Opex	Removal	Total
Latest Approval	0.600	0.100	0.100	0.800
Resanction Amount	1.212	0.076	0.227	1.515
Change*	0.612	(0.024)	0.127	0.715

Change = (Re-sanction – Amount Latest Approval)

2.4 Cost Summary Table

Project Number	Project Title	Project Estimate Level (%)	Spend ($M)	Prior Yrs	Current Planning Horizon Yr. 1 2017/18	Yr. 2 2018/19	Yr. 3 2019/20	Yr. 4 2020/21	Yr. 5 2021/22	Yr. 6+ 2022/23	Total
C052964	IRURD Rollingwood	Est Lvl (e.g. +/-10%)	CapEx	0.636	0.576	0.000	0.000	0.000	0.000	0.000	1.212
			OpEx	0.037	0.039	0.000	0.000	0.000	0.000	0.000	0.076
			Removal	0.122	0.105	0.000	0.000	0.000	0.000	0.000	0.227
			Total	0.795	0.720	0.000	0.000	0.000	0.000	0.000	1.515

2.5 Business Plan

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
FY18-FY22 Distribution Capital Plan	◉ Yes ○ No	○ Over ○ Under ◉ N/A	$0.000M

Resanction Request

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2.6 Drivers

Detailed Analysis Table

The following table indicates the major key variations that account for the difference between the original sanction amount and the requested resanction amount.

Detail Analysis (M's)	Over/Under Expenditure?	Amount
Change Orders	☒ Over ☐ Under	$0.285M
Estimate	☒ Over ☐ Under	$0.103M
Police Details	☒ Over ☐ Under	$0.144M
Consultants	☒ Over ☐ Under	$0.072M
Capital Overheads	☒ Over ☐ Under	$0.100M

2.6.1 Explanation of Key Variations

Change Orders:
The scope of work included the replacement of all submersible transformers. One location was omitted in the design and was field corrected. Also, a hand hole was relocated due to subsurface obstructions in the original location. Existing conduit had to be relocated to the new hand hole location.

Change orders were submitted for additional charges due to the extension of the project duration into the winter months. The original civil schedule required the work to be completed by December 30, 2016, but the start of construction was delayed causing the extension. Snow removal, heaters, and safety measures that were taken in the trench areas were not anticipated.

The total cost of completed change order work is $0.145M. An additional change order in the amount of $0.140M is also anticipated for construction that has not been invoiced, for a total variance of $0.285M.

Estimate:
The contract award amount for the civil work was $0.103M over the original estimate.

Police Details:
Due to the extended project duration, police detail charges were $0.094M in excess of the estimated costs. Another $0.050M is anticipated to complete line work portion of the project, for a total variance of $0.144M.

Consultants:
Consultant costs of $0.072M were not included in the original estimate.

Resanction Request

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Capital Overheads:
An estimated amount of $0.100M is expected at the close of the project.

2.7 If cost > approved Business Plan how will this be funded?

N/A

2.8 Key Milestones

Milestone	Target Date: (Month/Year)
Start Preliminary Engineering (kick-off meeting)	December/2013
Planning Sanction	January/2014
Engineering Design Complete - EDC	June/2014
Construction Start	October/2014
Construction Completed - CC	December/2017
Project Closure	March/2018

2.9 Next Planned Sanction Review

Date (Month/Year)	Purpose of Sanction Review
03/2018	Closure Paper

3 *Statements of Support*

3.1 Supporters

The supporters listed have aligned their part of the business to support the project.

Department	Individual	Responsibilities
Investment Planning	Glen DiConza	Endorses relative to distribution 5-year plan or emergent work
Resource Planning	Daniel Marceau	Endorses Resources, cost estimate, schedule, and Portfolio Alignment
Distribution Asset Management	Alan Labarre	Endorses scope, design, conformance with design standards

3.2 Reviewers

The reviewers have provided feedback on the content/language of the paper

Function	Individual
Finance	Felicia Midkiff
Regulatory	Renee Gurry
Jurisdictional	Sonny Anand
Procurement	Art Curran
Control Center	Mike Gallagher

Resanction Request

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4 *Decisions*

I:

(a) APPROVE this paper and the investment of $1.515M and a tolerance of +/-10%

(b) NOTE that Jack Saraiva is the Project Manager and has the approved financial delegation.

Signature.....Date.....7/27/11

Christopher Kelly, Senior Vice President – Electric Process and Engineering

Resanction Request

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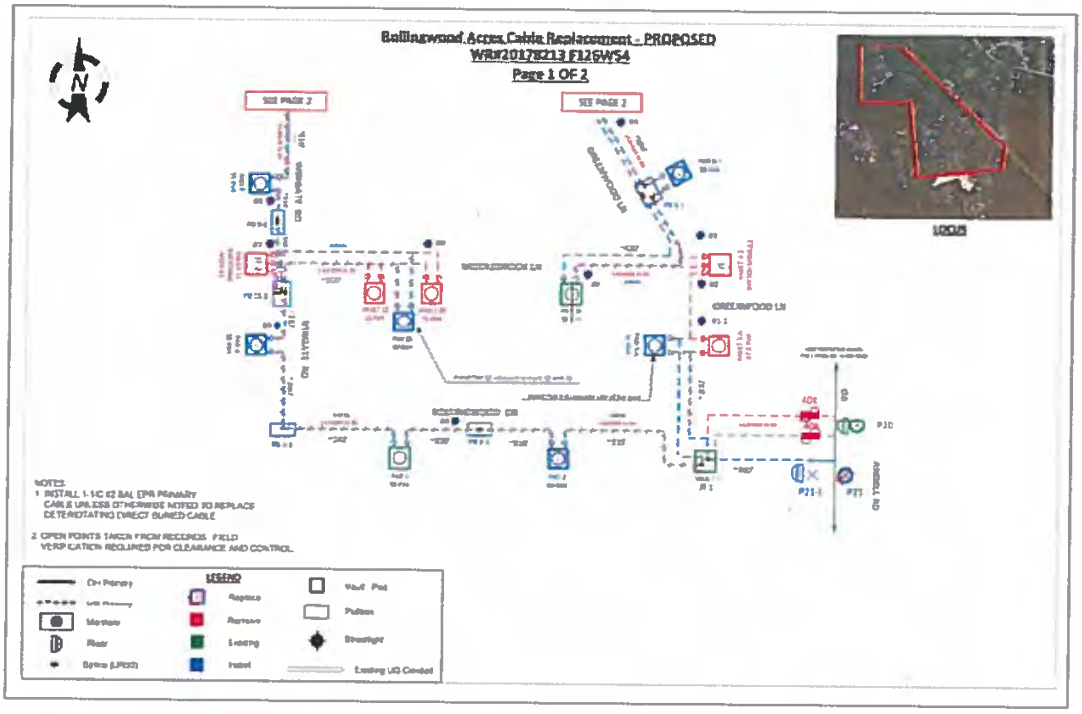
5 *Appendices*



Resanction Request

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