PJM Generator Interconnection Request
Queue #M06
Grand Point 69 kV
Back-up Interconnection Points
Feasibility / Impact Study

September 2005

Docs #322651

General

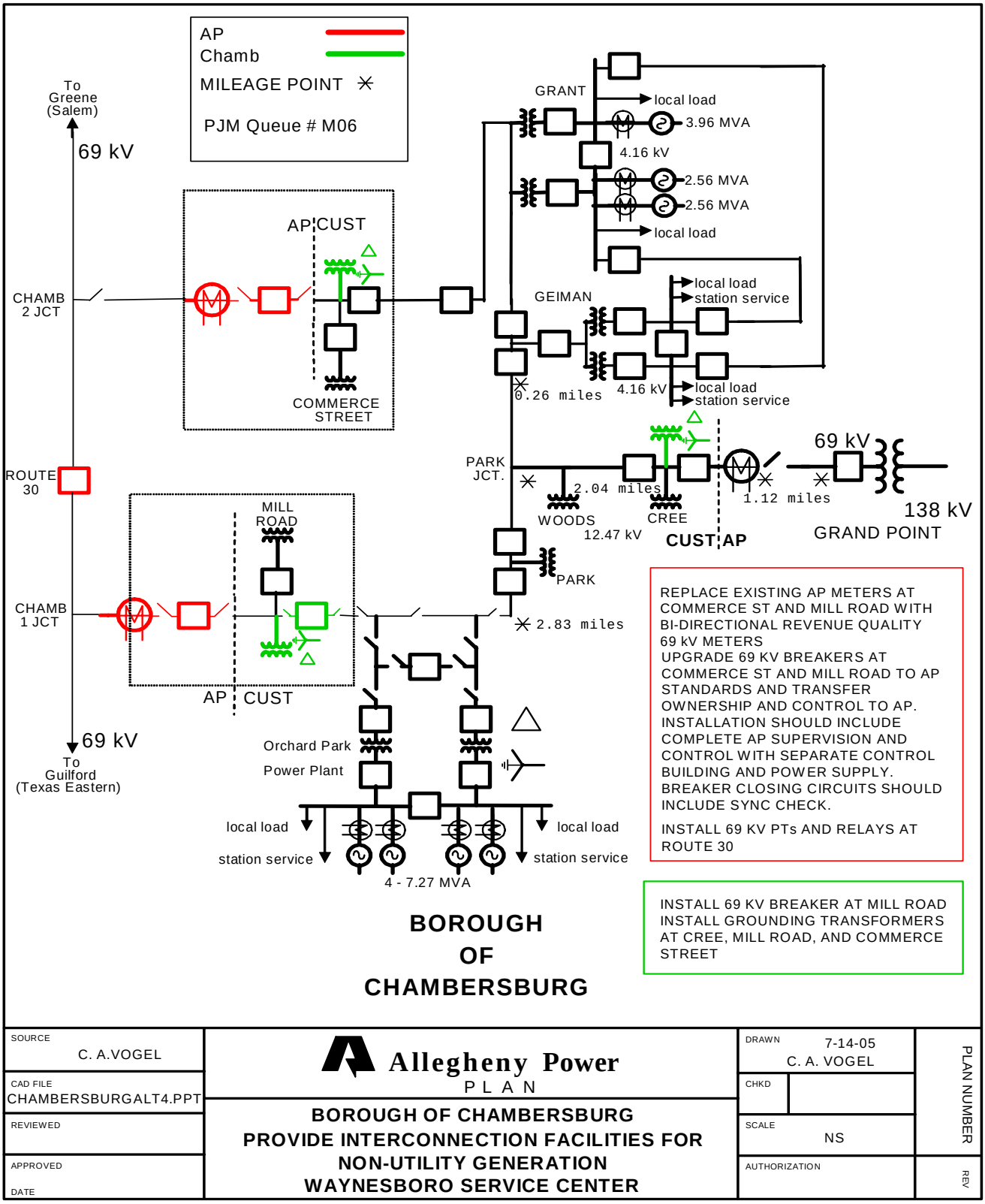
PJM Project Queue #M06 is a Borough of Chambersburg request to interconnect its existing 30.5 MW of diesel generating capacity currently interconnected at Grand Point Substation to two back-up interconnection points. The back-up interconnection points are Chambersburg Jct. 1 at Mill Road Substation and Chambersburg Jct. 2 at Commerce Street Substation. Both Mill Road and Commerce Street Substations are owned by Borough of Chambersburg. The back-up interconnection points would allow the Borough of Chambersburg to inject generation capacity into the Allegheny Power distribution system in the same manner that the generation capacity is injected at the primary interconnection point at Grand Point Substation.

The Grand Point Queue I12 project included the addition of the Orchard Park Generating Station, a 23.3 MW generating station at the Chambers-5 Business Park site near the city of Chambersburg, Franklin County, Pennsylvania. The I12 project new generation facilities consisted of four diesel/gas turbines each driving a generator producing 5.819 MW @ 0.8 pf and peak rating. This power is delivered through two 15/20/25 MVA, 69-12.47 kV generator step-up transformers into the existing Borough of Chambersburg 69 kV network. This generating facility was placed in service on 12/1/03 and went into commercial operation on 1/1/04. This generation capacity was in addition to the existing 7.2 MW Falling Spring Generation Station already in place (two 2.05 MW diesel/gas turbines and one 3.165 MW diesel/gas turbines, all at 0.8 pf, connected at 4.16 kV into the existing Borough of Chambersburg network). The current total Chambersburg generation is 30.5 MW.

The intent of the Feasibility / Impact study is to determine cost and construction time estimates of system reinforcements required to facilitate the interconnection of the back-up interconnection points to the PJM system. The system reinforcements include the direct connection of the generator to the system and any network upgrades necessary to maintain the reliability of the PJM system.

Direct Connection Requirements

The generation project is connected to the Allegheny Power system via an existing interconnection to the 138 kV system at Grand Point, and an interconnection to the 69 kV system at both Commerce Street and Mill Road substations. Except for the required installation of new 69 kV relaying, he existing direct connection facilities at Grand Point substation installed as part of the work required by queue I12 are sufficient to support the request for Capacity Interconnection Rights at the back-up interconnection points. Facility modifications at the back-up interconnection points and required system reinforcements to support Capacity Interconnection Rights for the M06 interconnection request are shown on the following one line diagram.



SOURCE C. A.VOGEL	Allegheny Power PLAN	DRAWN 7-14-05 C. A. VOGEL	PLAN NUMBER
CAD FILE CHAMBERSBURGALT4.PPT	BOROUGH OF CHAMBERSBURG PROVIDE INTERCONNECTION FACILITIES FOR NON-UTILITY GENERATION WAYNESBORO SERVICE CENTER	CHKD	
REVIEWED		SCALE NS	
APPROVED DATE		AUTHORIZATION	REV

Scope of Required Additional Interconnection Facilities :

Plant Size: 30.5 MW (existing at two sites)
Interconnection Points: Interconnection Customer-owned Commerce St. and Mill Road Substations

Mill Road Substation:

- Replace existing Allegheny Power meters with bi-directional revenue quality 69 kV meters.
- Upgrade 69 kV Breaker to Allegheny Power standards and transfer ownership and control to Allegheny Power.
- Install new 69 kV potential transformers as required.
- Install station service.
- Install relaying as required.
- Install new Allegheny Power control building to house Allegheny Power supervision and control equipment. Breaker closing circuits to contain synchronism check relaying with no auto-reclosing.
- Install new 69 kV Breaker.
- Install grounding transformer.

Commerce Street Substation:

- Replace existing Allegheny Power meters with bi-directional revenue quality 69 kV meters.
- Transfer ownership of 69 kV breaker terminal and control to Allegheny Power.
- Install new 69 kV potential transformers as required.
- Install station service.
- Install relaying as required.
- Install new Allegheny Power control building to house Allegheny Power supervision and control equipment. Breaker closing circuits to contain synchronism check relaying with no auto-reclosing.
- Install grounding transformer.

Network Impacts

Project #M06 was evaluated at 30.5 MW for compliance with reliability criteria for summer peak conditions in 2008. The results are summarized below:

Fault Study:

No breaker replacements required for the interconnections.

Listed below are the positive and zero sequence source equivalent impedance values at the two interconnection points with the GSUs and generators OPEN, and all three tie points (Cree, Mill Road, and Commerce Street) closed.

Mill Road

Positive: (0.01360 + j0.11293)
Zero: (0.01485 + j0.13513)

Commerce Street

Positive: (0.01325 + j0.11053)
Zero: (0.01850 + j0.14608)

System upgrades required:

Route 30 Substation:

- Install two 69 kV potential transformers
- 69 kV relaying

Grand Point Substation:

- 69 kV relaying

Cree Substation:

- Install grounding transformer

Normal System (ECAR Standard 1)
No identified problems.

Single Contingency (ECAR Standard 2)
No identified problems.

Multiple Facility Contingency (ECAR Standard 3)
No identified problems.

Generator Deliverability
No identified problems.

Short Circuit
No problems identified by PJM.

Stability Analysis (ECAR Document No. 1)
No problems were identified.

Contribution to Previously Identified System Reinforcements
None

Costs

Mill Road Substation:

Installed by Allegheny Power:

- Replace existing Allegheny Power meters with bi-directional revenue quality 69 kV meters.
- Upgrade 69 kV Breaker to Allegheny Power standards and transfer ownership and control to Allegheny Power.
- Install new 69 kV potential transformers as required
- Install station service
- Install relaying as required
- Install new Allegheny Power control building to house Allegheny Power supervision and control equipment. Breaker closing circuits to contain synchronism check relaying with no auto-reclosing.

Estimated Cost: $272,000

Installed by Interconnection Customer:

- Install new 69 kV Breaker
- Install grounding transformer

Commerce Street Substation:

Installed by Allegheny Power:

- Replace existing Allegheny Power meters with bi-directional revenue quality 69 kV meters.

- Transfer ownership of 69 kV breaker terminal and control to Allegheny Power.
- Install new 69 kV potential transformers as required
- Install station service
- Install relaying as required
- Install new Allegheny Power control building to house Allegheny Power supervision and control equipment. Breaker closing circuits to contain synchronism check relaying with no auto-reclosing.

Estimated Cost: $250,000

Installed by Interconnection Customer:

- Install grounding transformer

Route 30 Substation:

Installed by Allegheny Power:

- Install two 69 kV potential transformers
- 69 kV relaying

Estimated Cost: $105,000

Grand Point Substation:

Installed by Allegheny Power:

- 69 kV relaying

Estimated Cost: $12,000

Cree Substation:

Installed by Interconnection Customer:

- Install grounding transformer

Total Estimated Cost of work performed by Allegheny Power: $639,000

Assumptions:

The estimate above is based on the following assumptions:

1. The cost estimates above are based on 2005 dollars and do not include tax gross-up.

2. Cost estimates above do not include the Interconnection Customer's costs for installation of a new 69 kV Breaker at Mill Road Substation, and installation of grounding transformers at Mill Road, Commerce Street, and Cree Substations.

3. Estimates were developed assuming that Allegheny Power will be contracting the work.

4. The Interconnection Customer will be responsible to securing all required permits and approvals and will provide necessary access as required for Allegheny Power and any Allegheny Power contractors.
5. Allegheny Power's controls technicians will perform controls testing and acceptance tests.

Schedule:

It is estimated that the scope items performed by the Transmission Owner can be completed in 12 months (after execution of an Interconnection Service Agreement). This 12 month duration includes performing engineering and design work, substation construction work, relaying work and testing. The estimated duration for relaying work is 6 months and will be performed concurrently with the other construction activities.