Generation Interconnection

This analysis was completed to assess the reliability impact for a new generator interconnecting to the PJM system as a capacity resource.

Network Impacts -600 MW Injection into the Keystone 500kV substation

Network Impacts

Potential network impacts for the injection of 600 MW into the Keystone 500 kV substation were evaluated for summer peak conditions in 2004. The analysis performed for this project included a revised breaker configuration at the Erie West 345 kV as shown in Figure #2. The analysis performed for this project also included other system reinforcements, such as the 500/345 kV connection at Homer City shown in Figure #3, determined to be necessary to accommodate previously queued generators.

The system, as planned, was evaluated for compliance with reliability criteria. The results are summarized below.

Normal System

1. Overload on the Westfall 115/46 kV transformer. The new generator contributes 1 MW to the overload.

Single Contingency (MAAC Criteria IIA)

2. Voltage drops exceed 5% at Juniata 500 kV substation for the outage of the Hunterstown – Conastone 500 kV circuit and the Hunterstown 500/230 kV #1 transformer. This violation was previously identified for an earlier queued generator interconnection project (B06), and is what necessitates the new 350 MVAR SVC (Static Var Control) device at the Juniata 500 kV substation.

Multiple Facility Contingency (MAAC Criteria IIC)

3. No new problems were identified, and the new generator does not contribute to any previously identified multiple facility contingency problems.

Short Circuit Analysis

4. Fault duty was evaluated at all substations that had a greater than 5% increase in fault current due to the new generator. The fault duty was below all circuit breaker interrupting capabilities and, as such, no circuit breaker replacements are anticipated due to this project..

System Reinforcements

The following reinforcements are required to eliminate network problems specified above:

1. To eliminate the overload on the Westfall transformer, problem 1, the transformer will be replaced with a transformer with a higher rating. The estimated cost for the installation of the new transformer is $0.7 million and estimated time to complete is 2 years.

2. To eliminate the excessive voltage drops at the Juniata 500 kV substation, problem 2, a 350 MVAR SVC (Static Var Control) will be installed at the Juniata 500 kV substation. The estimated cost for the installation is $14.5 million and the estimated time to complete is 1.5 years. The estimate does not include the cost of land to expand the substation.

Total Cost

The total cost for the network upgrades to interconnect this project to the system is estimated to be a value not in excess of $15.2 million. The direct interconnection costs are estimated to be $5.07 million. The total cost to interconnect the project is, therefore, estimated to be a value not in excess of $20.27 million. The exact cost is dependent upon the percentage of the upgrades described in (1) and (2) above that are allocated to this project. Cost allocation will be specified in the Impact Study Report. It will take approximately 2 years to complete all of the upgrades required. The time to construct is dependent upon obtaining facilities outages in a timely manner as required for construction.

The project may be assessed operating and maintenance costs for the facilities required for interconnection of the project. These costs will be defined in later evaluations. It can be anticipated the present value of these costs will approximate 10% of the capital cost for interconnection.

Figure #1

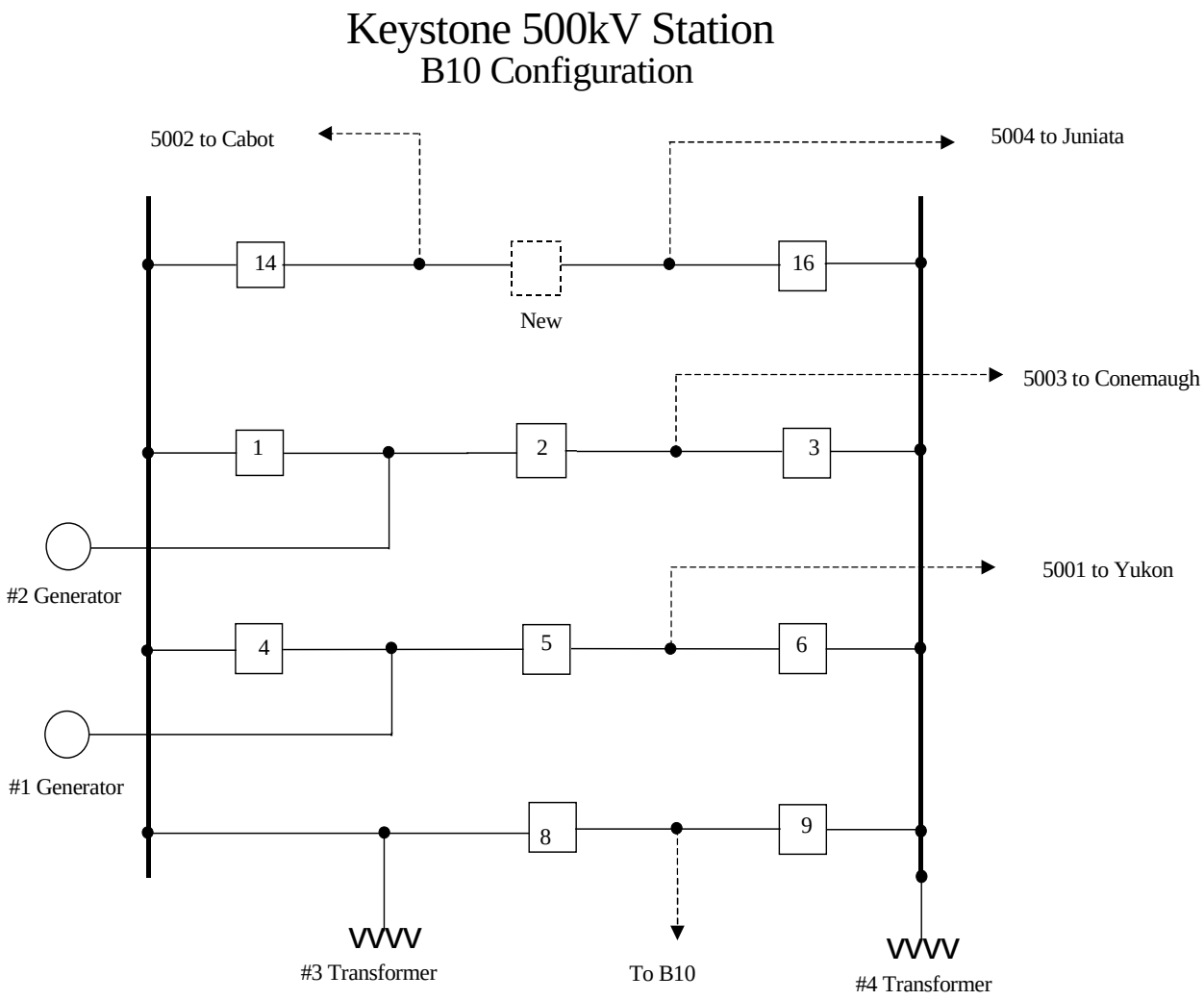

Keystone 500kV Station
B10 Configuration
5002 to Cabot
5004 to Juniata
14
16
New
5003 to Conemaugh
1
2
3
#2 Generator
5001 to Yukon
4
5
6
#1 Generator
8
9
#3 Transformer
To B10
#4 Transformer

Figure #2

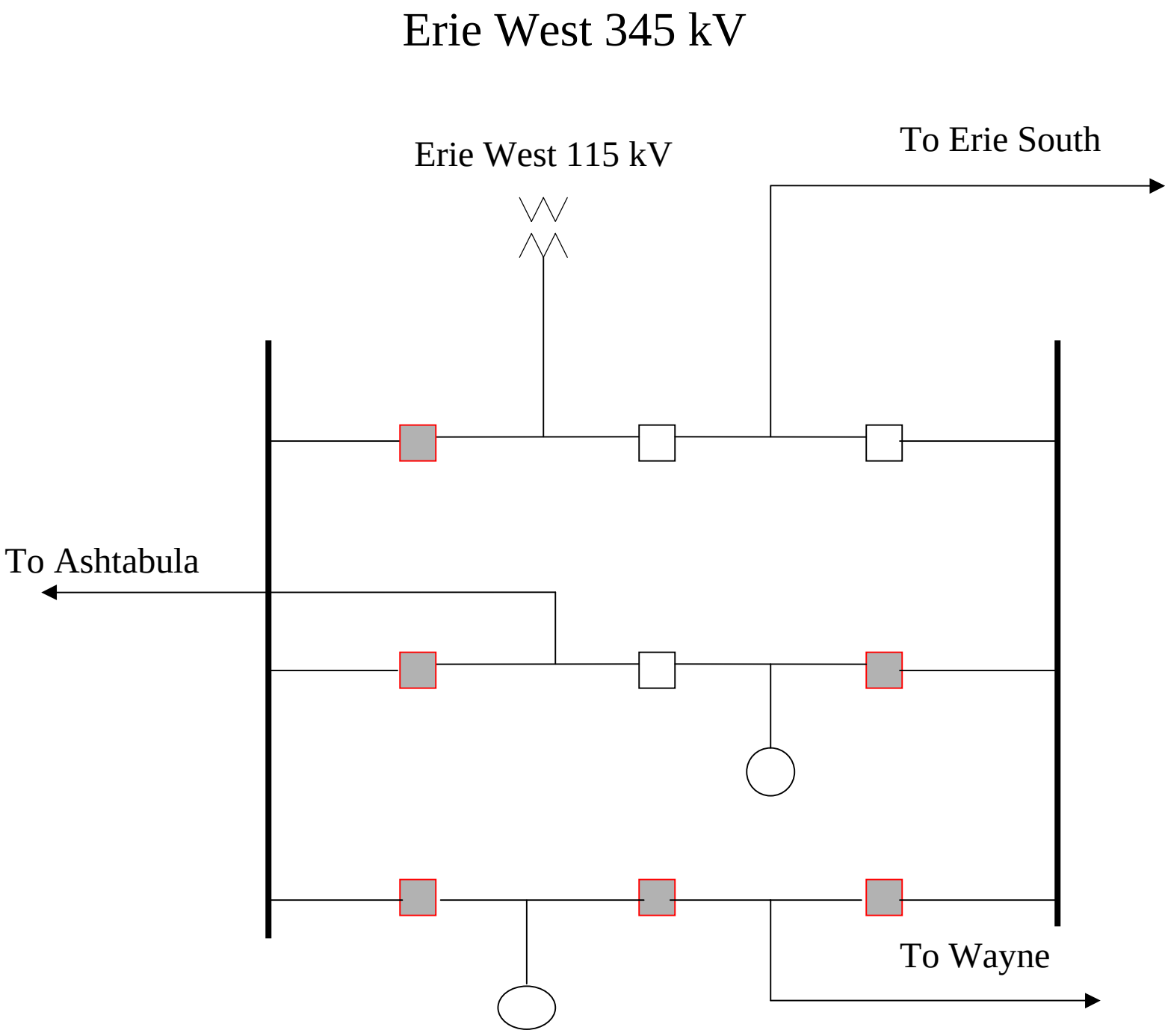
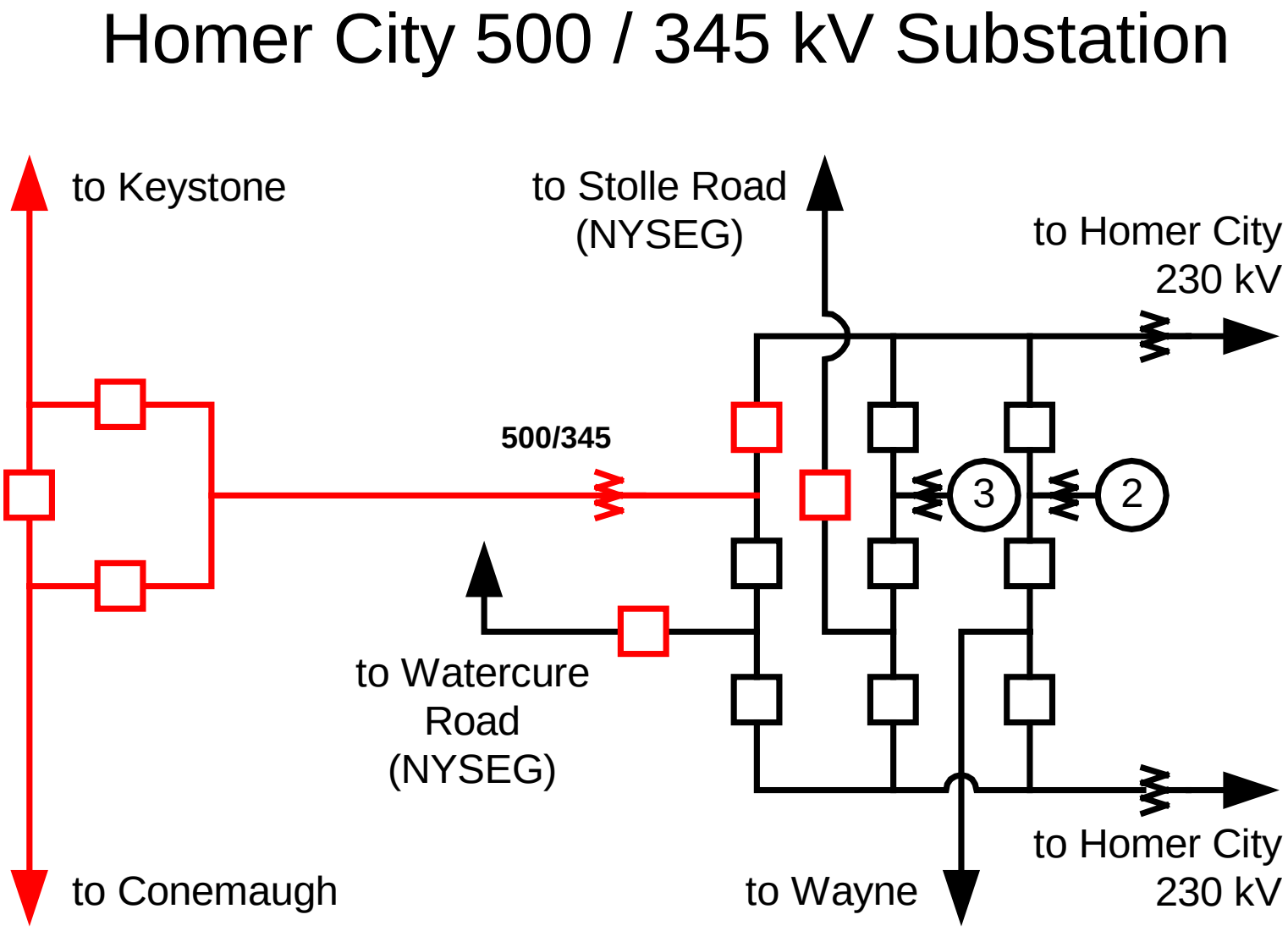

Erie West 345 kV
Erie West 115 kV
To Erie South
To Ashtabula
To Wayne

Figure #3


Homer City 500 / 345 kV Substation
to Keystone
to Stolle Road
(NYSEG)
to Homer City
230 kV
500/345
3
2
to Watercure
Road
(NYSEG)
to Conemaugh
to Wayne
to Homer City
230 kV