POWER ENGINEERS, INC.

2041 SOUTH COBALT POINT WAY
MERIDIAN, ID 83642 USA

PHONE 208-288-6100
FAX 208-288-6199

ENERGY
FACILITIES
COMMUNICATIONS
ENVIRONMENTAL

MEMORANDUM

DATE: June 10, 2016

TO: Puget Sound Energy

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FROM: Jason Pfaff, Department Manager

SUBJECT: Energize Eastside Photo Simulation Methodology

MESSAGE

POWER Engineers Used the Following Photo Simulation Approach on the Energize Eastside Transmission Line Project:

1. Key Observation Point Identification (KOPs) – POWER worked with PSE to determine KOP locations. KOPs are loaded into Google Earth, and discussed as a team to ensure all visual issues are addressed. KOP coordinates and markers were prepared for the field photo shoot.
2. Photo Collection – During the field Photo Shoot, POWER collected the following information:
    a. Camera – POWER uses a full frame Canon 5D Mark II or III professional Digital Camera. All photos are taken with a 50mm. lens. In some extreme foreground situations a 28mm. lens may be used. Up to 3 images were taken from a single location.
    b. Atmospheric Conditions – POWER documented the following information, as it has an impact of the photo simulation accuracy.
        i. Date, Time of Day (Hour/Minutes) – Determines color of sunlight, shadow location and irradiance levels.
        ii. Atmospheric conditions – Haze and light diffusion has an impact on contrast at distance
        iii. Lens length (50 mm is typical, in some cases 28mm)
3. Post field photo shoot – After the photography collection, representative photography from each KOP were compiled into a photo KMZ for PSE to review photography and locations.
4. 3D Existing Conditions Model – POWER developed an existing conditions 3D Model of the study areas including terrain and structures. The existing conditions models were used in the 3D photo registration process. Once the 3D existing conditions model has been developed using a minimum of 30 meter contour elevation data, GPS data was be imported into the 3D model and checked for spatial accuracy.
5. 3D Photo Registration – All photos carried forward for photo simulation development were registered into a 3D modeling program. Virtual Cameras were aligned with the field camera (Canon 5D Mark II, 5D Mark III) through the use of GPS, compass heading and horizontal angle information. Accuracy was further refined by importing and aligning the existing 3D model information into the 3D Program and ensuring it aligned exactly with the photographic background.

6. 3D Sun and Atmospheric Conditions – POWER imported all atmospheric data into the 3D Software to develop a sun and atmospheric system that matched the photography.
7. 3D Proposed Project Development – POWER developed the proposed project into a 3D Model. PSE worked with POWER to provide the PLS-CAD model data, as with any other CAD and GIS data available. PLS-CAD models are 3D engineering designs developed for each transmission line structure. All information was imported into the 3D existing conditions model and checked for accuracy. 3D materials (Corten Steel or Wood), and associated specular reflectance information were applied to the proposed 3D information.
8. 3D Rendering – After all information has been properly aligned, atmospherics checked and materials applied, POWER “rendered” the 3D information over the top of the 2D photography. The result was a new 3D image with an alpha channel allowing existing and proposed information to be separated different layers.
9. Photoshop – Photoshop was used in the last step of the process. Foreground screening elements such as trees, structures, etc are extracted and placed on separate layers. Proposed transmission line information was placed on separate layers, and background information is placed on their own layers. Separation of layers is an important step; as it allows for fine-tune adjustments to color, grain, and depth of field, atmospherics and contrast. Once all elements have been correctly adjusted and masking elements correct, all layers were merged into one single photo simulation.
10. Board Layouts – POWER created existing and proposed layouts, showing both images side by side in a PDF form.

Sincerely,

Jason Pfaff
Director of Visualization Services