APPENDIX F

VISUAL SIMULATIONS DOCUMENT



VISUAL SIMULATIONS
25 APRIL 2022
Carmel High School Stadium

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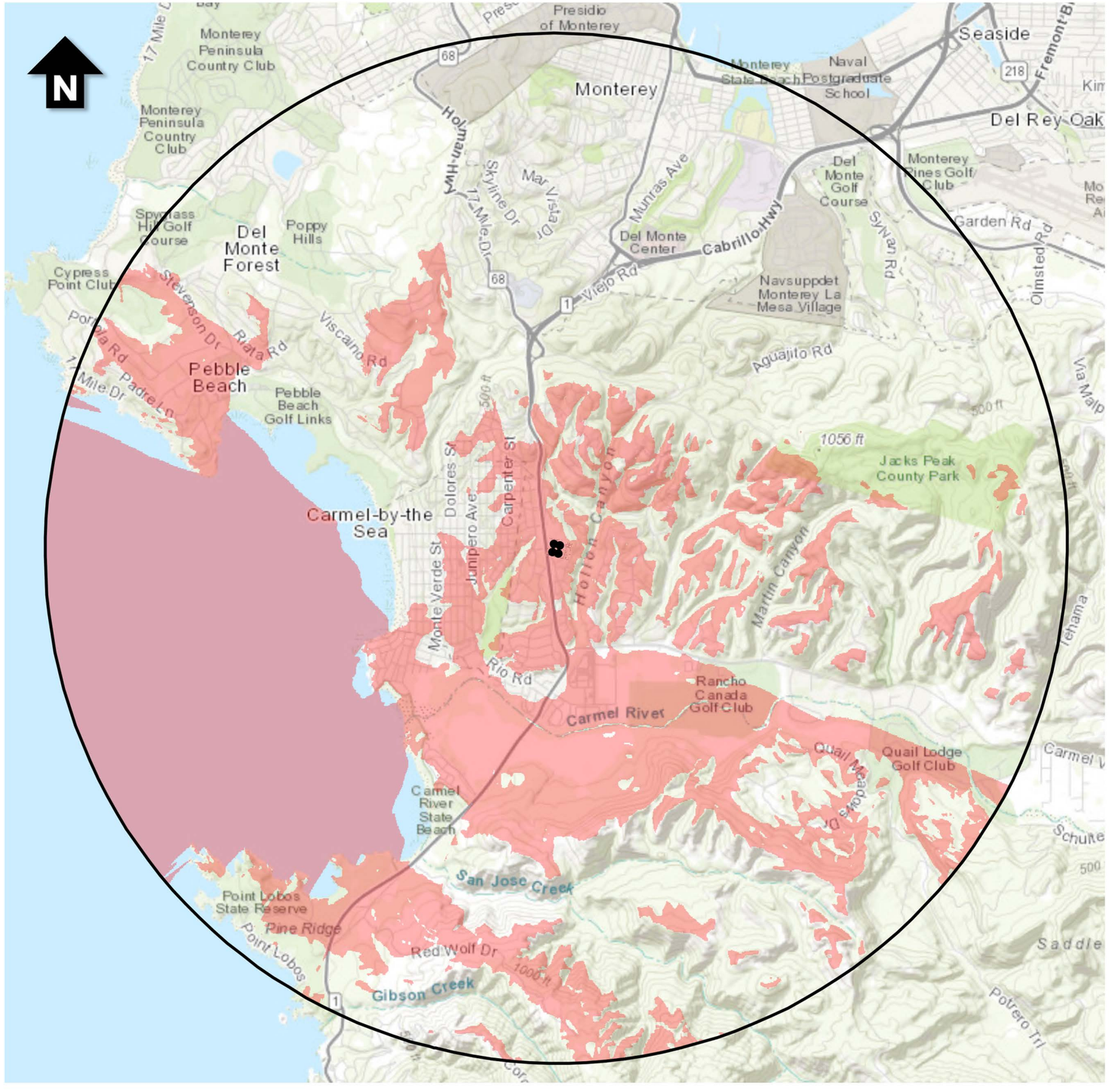
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Seen/Unseen Area Mapping:

A viewshed analysis for the proposed Carmel High School stadium lights was previously initiated by local area residents within the Carmel Unified School District, (CUSD). That study utilized Google Earth tools to achieve its results. This analysis is intended to respond to that study. The following discussion outlines the procedures taken to achieve a Seen/Unseen analysis of 4 proposed 70 and 80 foot high stadium lights at Carmel High School in Carmel, California.

Data provided was in the form of AutoCAD.dwg and .pdf files. The stadium towers were captured from the file Musco lighting plan. That file was then converted to an image file, and georeferenced to Bing imagery using ESRI ArcGIS software.

Four towers were digitized to create StadiumLights.shp. Attributes were added for name and height. The names, F1-F4 were taken from Musco plan. Base elevation values 'Z field' for each tower were calculated using the 'Add Surface Information' tool in the Functional Surface toolbox in ArcGIS 3D Analyst Extension. The USGS 10-meter Digital Elevation Model (DEM) was used in the viewshed analysis and for all surface related analysis. The native elevation attributes in the DEM are stated in meters so the Height_m attribute field was created and the tower heights were converted to meters for the analysis. The Z value and Height_m fields were added together to obtain the top of the tower height. This field is called 'Observer' and is used in the viewshed analysis.

A 3.5-mile buffer was created around the 4 proposed towers to define the limit of the viewshed analysis. The USGS DEM was clipped to this buffer for the analysis. This is done to speed up the processing time. The native DEM covers much more area than is required for the analysis. Using the 'Visibility' tool in the ArcGIS Spatial Analyst-Surface toolbox, the cells of the DEM which are in a direct sight-line of each of the towers is calculated and attributed as 'Visible' or 'Not Visible. Note: Those cells classified as 'Visible' may still be screened by intervening landscape, which is not a processing parameter.

Elevation Data Source: USGS 10m DEM

1 inch = 5,000 feet 1:60,000

0 0.5 1 2 3 Miles

VIEWSHED ANALYSIS AND METHODOLOGY

Carmel High School Stadium

VISIBILITY LEGEND:

- STADIUM LIGHTS
- LIMIT OF ANALYSIS (3.5 MILE RADIUS)
- AREAS WHERE STADIUM LIGHTS MAY BE VISIBLE

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Digital Photography:

Based on the aforementioned viewshed analysis, digital and field reconnaissance, 13 sensitive receptors were identified. Of those 13 sensitive receptors, 9 locations were selected due to their potential visibility as KOPs, Key Observation Points. The design visualization methodology, and the corresponding software platforms employed in the visual simulation process, are described herein, and are consistent with best industry practices:

First, high resolution digital photography was captured from the 9 key observation points, (KOPs), verified by the use of GPS location support data. A standard 35mm SLR camera was utilized consistently throughout the process, resulting in what is referred to as a “normal” view. A normal view allows for viewing of the 3D model under similar circumstances to the proposed project physically viewed in the field.

3D Model Generation:

Next, the digital photography, along with the corresponding GPS support data was referenced in real world scale to 3D Computer Aided Design (CAD) platforms; (3D Studio & AutoCAD) respectively. To ensure a high degree of visual accuracy in the simulations, Computer Aided Design (CAD) allows for life-size 3D modeling within the computer. This translates to using real world scale and dimension to locate and portray facilities/structures and terrain features. Other data utilized to verify simulation precision includes: aerial photography and Google Earth topographical data.

To verify proposed structure location, elevation, and orientation, Google Earth topographical and aerial photography data were initially employed as background reference files. Then 3D Studio massing models of the proposed structures were constructed, based upon AutoCAD data provided by the Applicant. Camera positions and orientations were also recorded in the same 3D coordinate space, according to the aforementioned GPS location data and aerial photography. Completing these stages of the process, the 3D Studio massing models of the proposed structures, and the camera locations, now exist together in real world scale with respect to distance, elevation and orientation.

3D Camera Design and Production:

To generate the correct view relative to the digital photography, a 3D 35mm digital camera lens, matching the physical lens from the field, was set up at its appropriate position in 3D coordinate space; again verified by the GPS location support data. Next, the digital photography was imported into the 3D database and loaded as an environment map, generating the digital camera view of the 3D model.

From here, the 3D massing models of the proposed structures were displayed, along with any significant existing structures, so that proper alignment, scale, angle, and distance could be verified. To complete the process, materials and texture mapping were applied to the 3D models. Then, a reality-based lighting solution was generated, based on lighting engineering data provided by the Applicant. To achieve this, physically based, photometric light sources were placed within the 3D model to represent each fixture. Light source characteristics were then matched, according to the engineering lighting data, including; light fixture type, light power, temperature/color, and angle. And finally, the visual simulation was then generated with a physically based rendering engine, utilizing a multi-threaded image processing algorithm commonly known as, Ray Tracing.

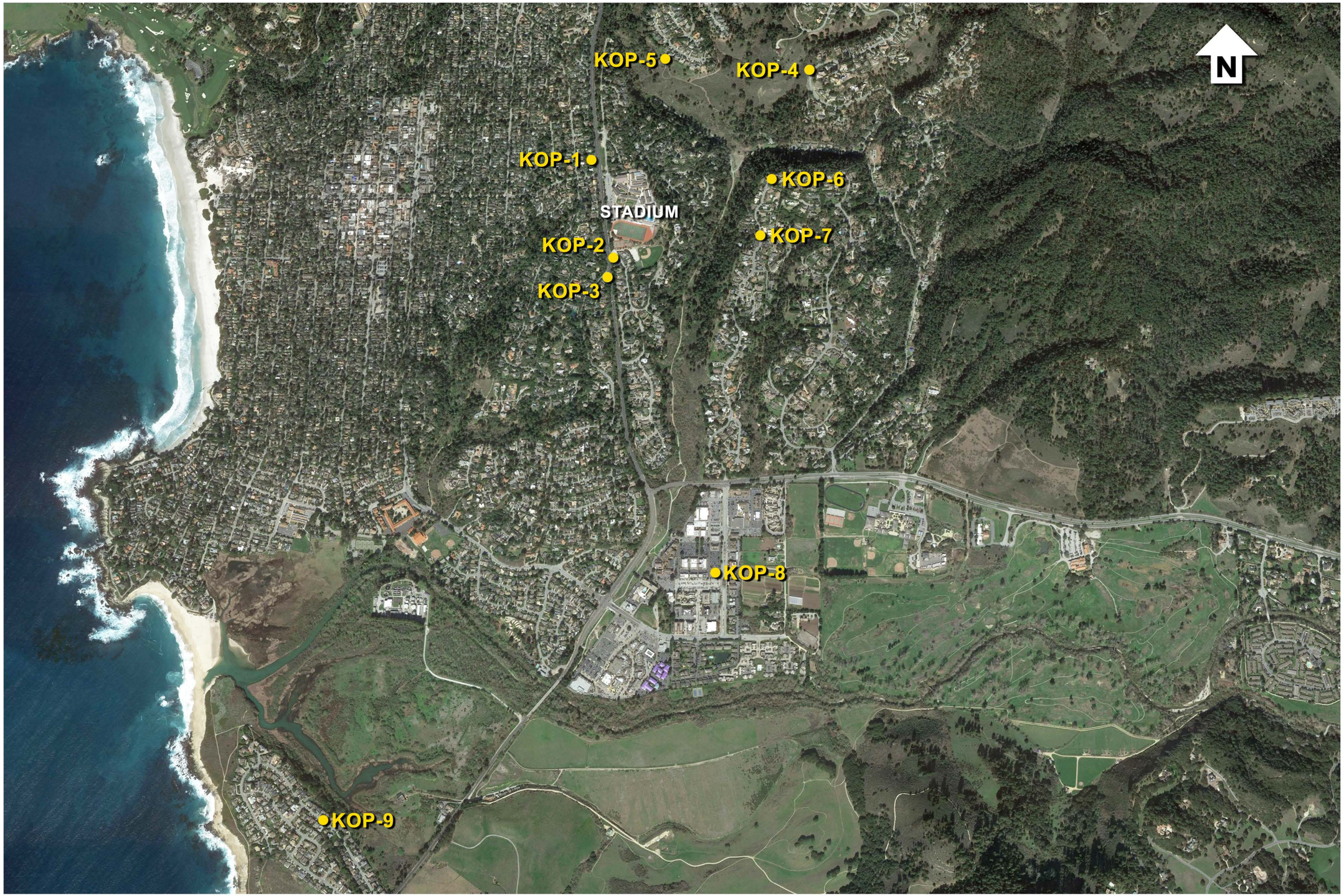
VISUAL SIMULATION METHODOLOGY

Carmel High School Stadium

VISIBILITY LEGEND:

- STADIUM LIGHTS
- LIMIT OF ANALYSIS (3.5 MILE RADIUS)
- AREAS WHERE STADIUM LIGHTS MAY BE VISIBLE

WWW.3DSCAPE.NET



KOP LOCATION MAP

Carmel High School Stadium

KOP LEGEND:

KOP LOCATION
(KEY OBSERVATION POINT)

KOP DESCRIPTION:

KOP-1: HWY-1 NORTH

KOP-2: MORSE DRIVE

KOP-3: HWY-1 SOUTH

KOP-4: OUTLOOK DRIVE

KOP-5: EDGEFIELD PLACE

KOP-6: CARMEL KNOLLS DRIVE NORTH

KOP-7: CARMEL KNOLLS DRIVE SOUTH

KOP-8: CARMEL RANCHO SHOPPING CENTER

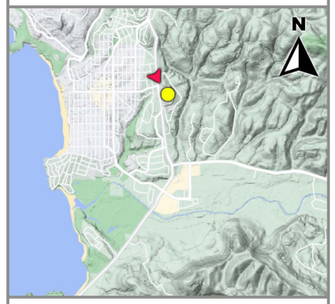
KOP-9: CARMEL MEADOWS

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KOP-01: HWY-1 NORTH

Carmel High School Stadium

Existing Condition-Day



KOP LOCATION

STADIUM LOCATION

KOP FIELD DATA

POSITION:
36°33’23.28”N
121°54’41.16”W

ELEVATION:
373 FT

DISTANCE:
1,167 FT

HEADING:
150°

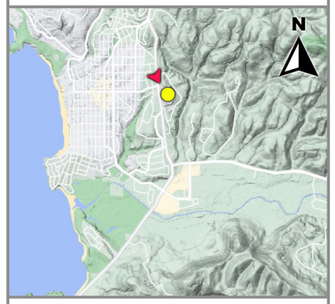
CAMERA LENS:
35 mm

WWW.3DSCAPE.NET

KOP-01: HWY-1 NORTH

Carmel High School Stadium

Visual Simulation-Day



KOP LOCATION

STADIUM LOCATION

KOP FIELD DATA

POSITION:
36°33’23.28”N
121°54’41.16”W

ELEVATION:
373 FT

DISTANCE:
1,167 FT

HEADING:
150°

CAMERA LENS:
35 mm

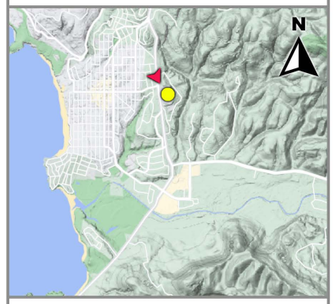
WWW.3DSCAPE.NET



KOP-01: HWY-1 NORTH

Carmel High School Stadium

Existing Condition-Night



KOP LOCATION

STADIUM LOCATION

KOP FIELD DATA

POSITION:
36°33’23.28”N
121°54’41.16”W

ELEVATION:
373 FT

DISTANCE:
1,167 FT

HEADING:
150°

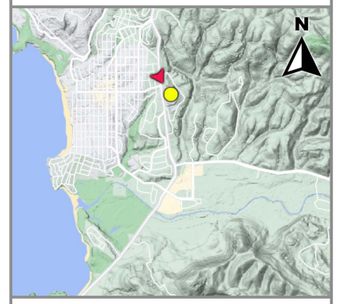
CAMERA LENS:
35 mm

WWW.3DSCAPE.NET

KOP-01: HWY-1 NORTH

Carmel High School Stadium

Visual Simulation-Night



KOP LOCATION

STADIUM LOCATION

KOP FIELD DATA

POSITION:
36°33’23.28”N
121°54’41.16”W

ELEVATION:
373 FT

DISTANCE:
1,167 FT

HEADING:
150°

CAMERA LENS:
35 mm

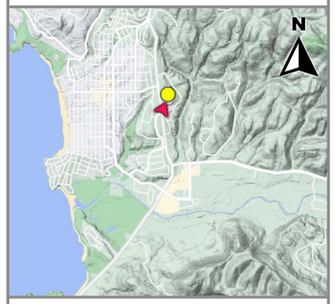
WWW.3DSCAPE.NET



KOP-02: MORSE DR.

Carmel High School Stadium

Existing Condition-Day



KOP LOCATION

STADIUM LOCATION

KOP FIELD DATA

POSITION:
36°33’09.35”N
121°54’37.30”W

ELEVATION:
320 FT

DISTANCE:
445 FT

HEADING:
25°

CAMERA LENS:
35 mm

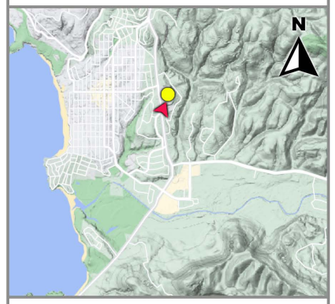
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KOP-02: MORSE DR.

Carmel High School Stadium

Visual Simulation-Day



KOP LOCATION

STADIUM LOCATION

KOP FIELD DATA

POSITION:
36°33’09.35”N
121°54’37.30”W

ELEVATION:
320 FT

DISTANCE:
445 FT

HEADING:
25°

CAMERA LENS:
35 mm

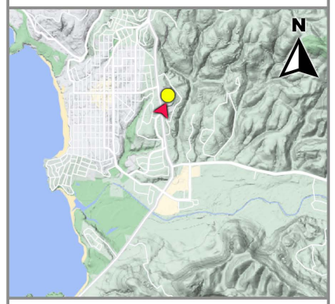
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KOP-02: MORSE DR.

Carmel High School Stadium

Existing Condition-Night



KOP LOCATION

STADIUM LOCATION

KOP FIELD DATA

POSITION:
36°33’09.35”N
121°54’37.30”W

ELEVATION:
320 FT

DISTANCE:
445 FT

HEADING:
25°

CAMERA LENS:
35 mm

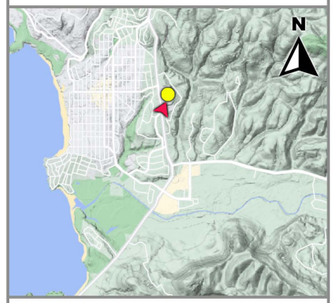
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KOP-02: MORSE DR.

Carmel High School Stadium

Visual Simulation-Night



KOP LOCATION

STADIUM LOCATION

KOP FIELD DATA

POSITION:
36°33’09.35”N
121°54’37.30”W

ELEVATION:
320 FT

DISTANCE:
445 FT

HEADING:
25°

CAMERA LENS:
35 mm

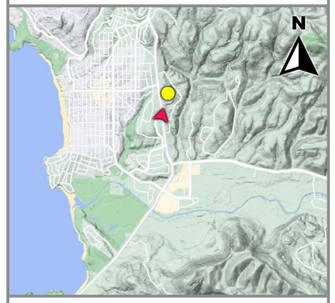
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KOP-03: HWY-1 SOUTH

Carmel High School Stadium

Existing Condition-Night



KOP LOCATION

STADIUM LOCATION

KOP FIELD DATA

POSITION:
36°33’06.79”N
121°54’38.21”W

ELEVATION:
300 FT

DISTANCE:
732 FT

HEADING:
14°

CAMERA LENS:
35 mm

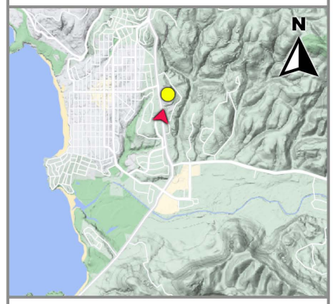
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KOP-03: HWY-1 SOUTH

Carmel High School Stadium

Visual Simulation-Night



KOP LOCATION

STADIUM LOCATION

KOP FIELD DATA

POSITION:
36°33’06.79”N
121°54’38.21”W

ELEVATION:
300 FT

DISTANCE:
732 FT

HEADING:
14°

CAMERA LENS:
35 mm

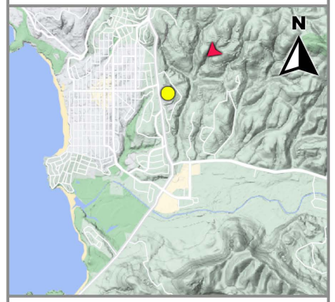
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KOP-04: OUTLOOK DR.

Carmel High School Stadium

Existing Condition-Day



KOP LOCATION

STADIUM LOCATION

KOP FIELD DATA

POSITION:
36°33’37.73”N
121°54’03.26”W

ELEVATION:
520 FT

DISTANCE:
3,546 FT

HEADING:
230°

CAMERA LENS:
35 mm

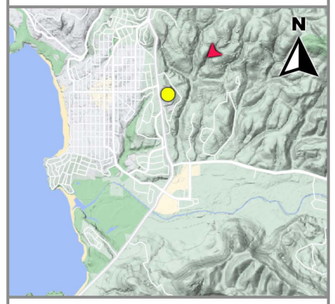
WWW.3DSCAPE.NET



KOP-04: OUTLOOK DR.

Carmel High School Stadium

Visual Simulation-Day



KOP LOCATION

STADIUM LOCATION

KOP FIELD DATA

POSITION:
36°33’37.73”N
121°54’03.26”W

ELEVATION:
520 FT

DISTANCE:
3,546 FT

HEADING:
230°

CAMERA LENS:
35 mm

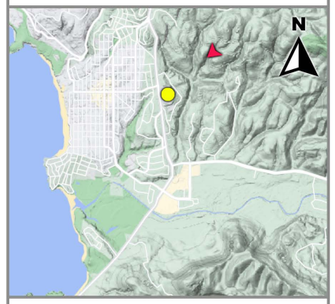
WWW.3DSCAPE.NET



KOP-04: OUTLOOK DR.

Carmel High School Stadium

Existing Condition-Night



KOP LOCATION

STADIUM LOCATION

KOP FIELD DATA

POSITION:
36°33’37.73”N
121°54’03.26”W

ELEVATION:
520 FT

DISTANCE:
3,546 FT

HEADING:
230°

CAMERA LENS:
35 mm

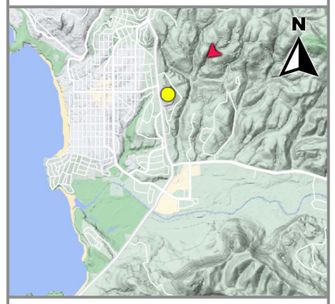
WWW.3DSCAPE.NET



KOP-04: OUTLOOK DR.

Carmel High School Stadium

Visual Simulation-Night



KOP LOCATION

STADIUM LOCATION

KOP FIELD DATA

POSITION:
36°33’37.73”N
121°54’03.26”W

ELEVATION:
520 FT

DISTANCE:
3,546 FT

HEADING:
230°

CAMERA LENS:
35 mm

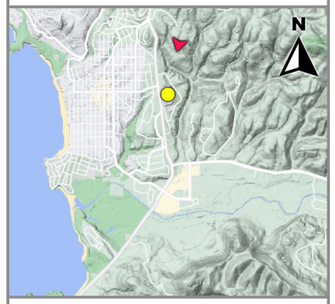
WWW.3DSCAPE.NET



KOP-05: EDGEFIELD PL.

Carmel High School Stadium

Existing Condition-Day



KOP LOCATION

STADIUM LOCATION

KOP FIELD DATA

POSITION:
36°33’38.61”N
121°54’29.15”W

ELEVATION:
445 FT

DISTANCE:
2,618 FT

HEADING:
195°

CAMERA LENS:
35 mm

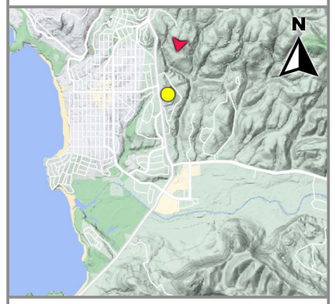
WWW.3DSCAPE.NET



KOP-05: EDGEFIELD PL.

Carmel High School Stadium

Visual Simulation-Day



KOP LOCATION

STADIUM LOCATION

KOP FIELD DATA

POSITION:
36°33’38.61”N
121°54’29.15”W

ELEVATION:
445 FT

DISTANCE:
2,618 FT

HEADING:
195°

CAMERA LENS:
35 mm

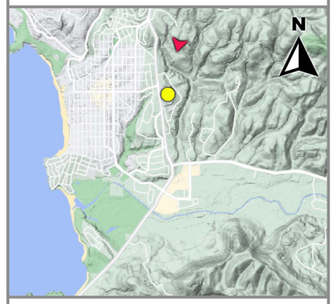
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KOP-05: EDGEFIELD PL.

Carmel High School Stadium

Existing Condition-Night



KOP LOCATION

STADIUM LOCATION

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36°33’38.61”N
121°54’29.15”W

ELEVATION:
445 FT

DISTANCE:
2,618 FT

HEADING:
195°

CAMERA LENS:
35 mm

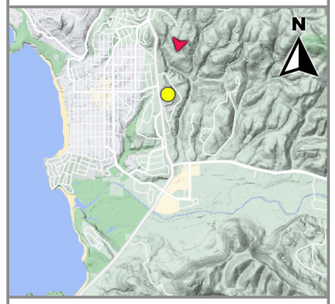
WWW.3DSCAPE.NET



KOP-05: EDGEFIELD PL.

Carmel High School Stadium

Visual Simulation-Night



KOP LOCATION

STADIUM LOCATION

KOP FIELD DATA

POSITION:
36°33’38.61”N
121°54’29.15”W

ELEVATION:
445 FT

DISTANCE:
2,618 FT

HEADING:
195°

CAMERA LENS:
35 mm

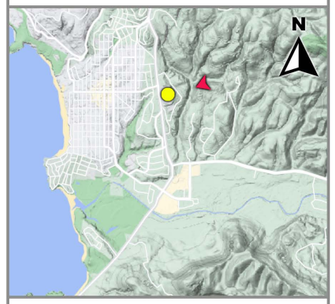
WWW.3DSCAPE.NET



KOP-06: CARMEL KNOLLS DR. NORTH

Carmel High School Stadium

Existing Condition-Day



KOP LOCATION

STADIUM LOCATION

KOP FIELD DATA

POSITION:
36°33’20.90”N
121°54’10.22”W

ELEVATION:
409 FT

DISTANCE:
2,126 FT

HEADING:
249°

CAMERA LENS:
35 mm

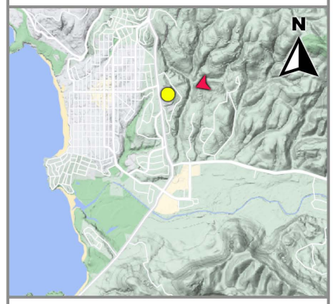
WWW.3DSCAPE.NET



KOP-06: CARMEL KNOLLS DR. NORTH

Carmel High School Stadium

Visual Simulation-Day



KOP LOCATION

STADIUM LOCATION

KOP FIELD DATA

POSITION:
36°33’20.90”N
121°54’10.22”W

ELEVATION:
409 FT

DISTANCE:
2,126 FT

HEADING:
249°

CAMERA LENS:
35 mm

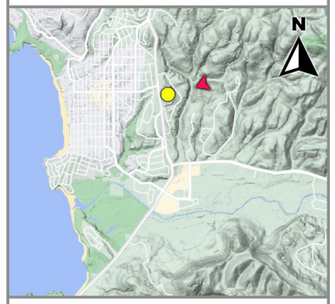
WWW.3DSCAPE.NET



KOP-06: CARMEL KNOLLS DR. NORTH

Carmel High School Stadium

Existing Condition-Night



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STADIUM LOCATION

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DISTANCE:
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249°

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35 mm

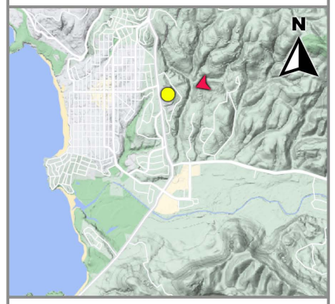
WWW.3DSCAPE.NET



KOP-06: CARMEL KNOLLS DR. NORTH

Carmel High School Stadium

Visual Simulation-Night



KOP LOCATION

STADIUM LOCATION

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ELEVATION:
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2,126 FT

HEADING:
249°

CAMERA LENS:
35 mm

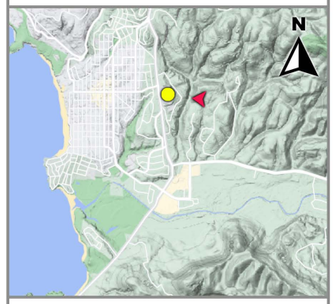
WWW.3DSCAPE.NET



KOP-07: CARMEL KNOLLS DR. SOUTH

Carmel High School Stadium

Existing Condition-Day



KOP LOCATION

STADIUM LOCATION

KOP FIELD DATA

POSITION:
36°33’12.51”N
121°54’12.21”W

ELEVATION:
284 FT

DISTANCE:
1,809 FT

HEADING:
273°

CAMERA LENS:
35 mm

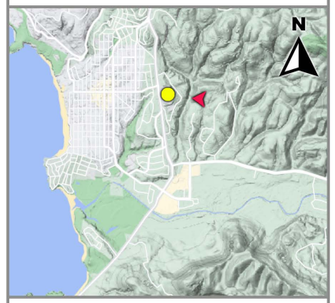
WWW.3DSCAPE.NET



KOP-07: CARMEL KNOLLS DR. SOUTH

Carmel High School Stadium

Visual Simulation-Day



KOP LOCATION

STADIUM LOCATION

KOP FIELD DATA

POSITION:
36°33’12.51”N
121°54’12.21”W

ELEVATION:
284 FT

DISTANCE:
1,809 FT

HEADING:
273°

CAMERA LENS:
35 mm

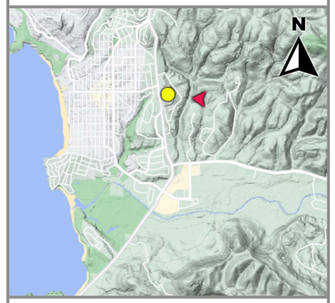
WWW.3DSCAPE.NET



KOP-07: CARMEL KNOLLS DR. SOUTH

Carmel High School Stadium

Existing Condition-Night



KOP LOCATION

STADIUM LOCATION

KOP FIELD DATA

POSITION:
36°33’12.51”N
121°54’12.21”W

ELEVATION:
284 FT

DISTANCE:
1,809 FT

HEADING:
273°

CAMERA LENS:
35 mm

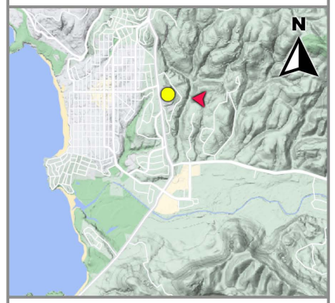
WWW.3DSCAPE.NET



KOP-07: CARMEL KNOLLS DR. SOUTH

Carmel High School Stadium

Visual Simulation-Night



KOP LOCATION

STADIUM LOCATION

KOP FIELD DATA

POSITION:
36°33’12.51”N
121°54’12.21”W

ELEVATION:
284 FT

DISTANCE:
1,809 FT

HEADING:
273°

CAMERA LENS:
35 mm

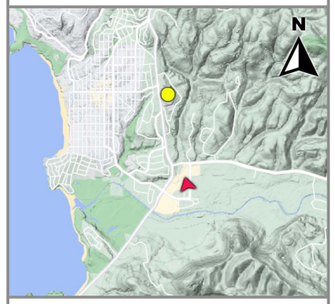
WWW.3DSCAPE.NET



KOP-08: CARMEL RANCHO SHOPPING CTR

Carmel High School Stadium

Existing Condition-Day



KOP LOCATION

STADIUM LOCATION

KOP FIELD DATA

POSITION:
36°32’25.64”N
121°54’18.87”W

ELEVATION:
37 FT

DISTANCE:
4,975 FT

HEADING:
348°

CAMERA LENS:
35 mm

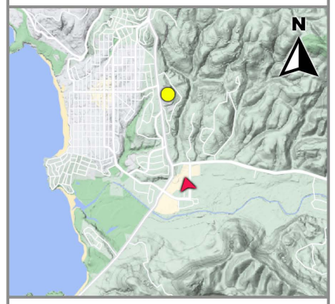
WWW.3DSCAPE.NET



KOP-08: CARMEL RANCHO SHOPPING CTR

Carmel High School Stadium

Visual Simulation-Day



KOP LOCATION

STADIUM LOCATION

KOP FIELD DATA

POSITION:
36°32’25.64”N
121°54’18.87”W

ELEVATION:
37 FT

DISTANCE:
4,975 FT

HEADING:
348°

CAMERA LENS:
35 mm

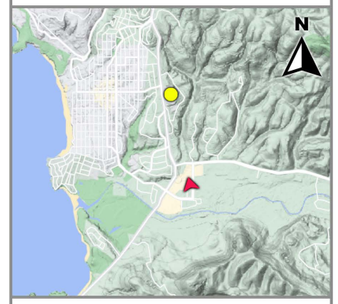
WWW.3DSCAPE.NET



KOP-08: CARMEL RANCHO SHOPPING CTR

Carmel High School Stadium

Existing Condition-Night



KOP LOCATION

STADIUM LOCATION

KOP FIELD DATA

POSITION:
36°32’25.64”N
121°54’18.87”W

ELEVATION:
37 FT

DISTANCE:
4,975 FT

HEADING:
348°

CAMERA LENS:
35 mm

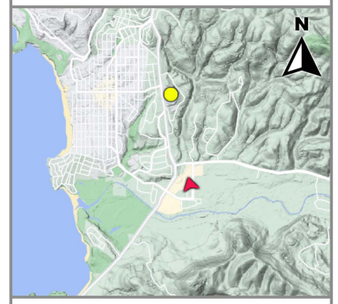
WWW.3DSCAPE.NET



KOP-08: CARMEL RANCHO SHOPPING CTR

Carmel High School Stadium

Visual Simulation-Night



KOP LOCATION

STADIUM LOCATION

KOP FIELD DATA

POSITION:
36°32’25.64”N
121°54’18.87”W

ELEVATION:
37 FT

DISTANCE:
4,975 FT

HEADING:
348°

CAMERA LENS:
35 mm

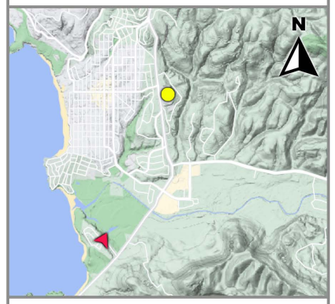
WWW.3DSCAPE.NET



KOP-09: CARMEL MEADOWS

Carmel High School Stadium

Existing Condition-Day



KOP LOCATION

STADIUM LOCATION

KOP FIELD DATA

POSITION:
36°31’54.32”N
121°55’19.65”W

ELEVATION:
96 FT

DISTANCE:
8,815 FT

HEADING:
29°

CAMERA LENS:
35 mm

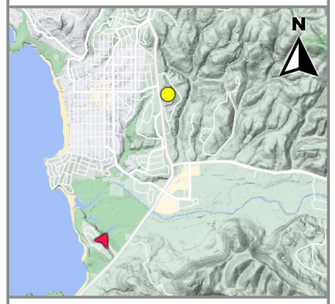
WWW.3DSCAPE.NET



KOP-09: CARMEL MEADOWS

Carmel High School Stadium

Visual Simulation-Day



KOP LOCATION

STADIUM LOCATION

KOP FIELD DATA

POSITION:
36°31’54.32”N
121°55’19.65”W

ELEVATION:
96 FT

DISTANCE:
8,815 FT

HEADING:
29°

CAMERA LENS:
35 mm

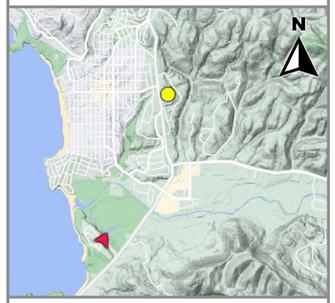
WWW.3DSCAPE.NET



KOP-09: CARMEL MEADOWS

Carmel High School Stadium

Existing Condition-Night



KOP LOCATION

STADIUM LOCATION

KOP FIELD DATA

POSITION:
36°31’54.32”N
121°55’19.65”W

ELEVATION:
96 FT

DISTANCE:
8,815 FT

HEADING:
29°

CAMERA LENS:
35 mm

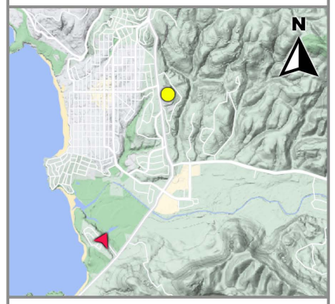
WWW.3DSCAPE.NET



KOP-09: CARMEL MEADOWS

Carmel High School Stadium

Visual Simulation-Night



KOP LOCATION

STADIUM LOCATION

KOP FIELD DATA

POSITION:
36°31’54.32”N
121°55’19.65”W

ELEVATION:
96 FT

DISTANCE:
8,815 FT

HEADING:
29°

CAMERA LENS:
35 mm

WWW.3DSCAPE.NET

Carmel High School Stadium Lighting

3DSCAPE