

Board Presentation

20FEB19

Carson City, NV
(KCXP)

Nighttime Feasibility
Study



Feasibility Study



Nighttime Operations Challenge



Potential Solution(s)



Benefits



Cost and Schedule



Likelihood of FAA Approval

Not included in this Feasibility Study

x Environmental Analysis

x Design

x Funding

x FAA Review

Future analysis required to examine NEPA

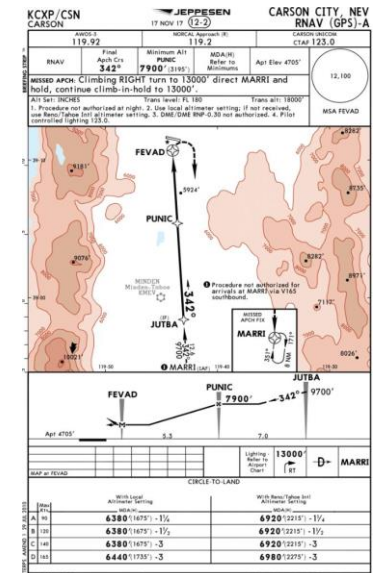
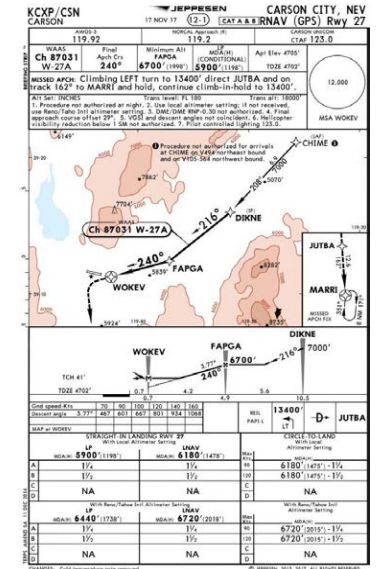
Exhibits are provided for ROM cost estimation and criteria considerations

Mechanisms to obtain funding would be addressed via other processes

Study still needs to be reviewed with FAA Stakeholders

Nighttime Restrictions Flight Inspection

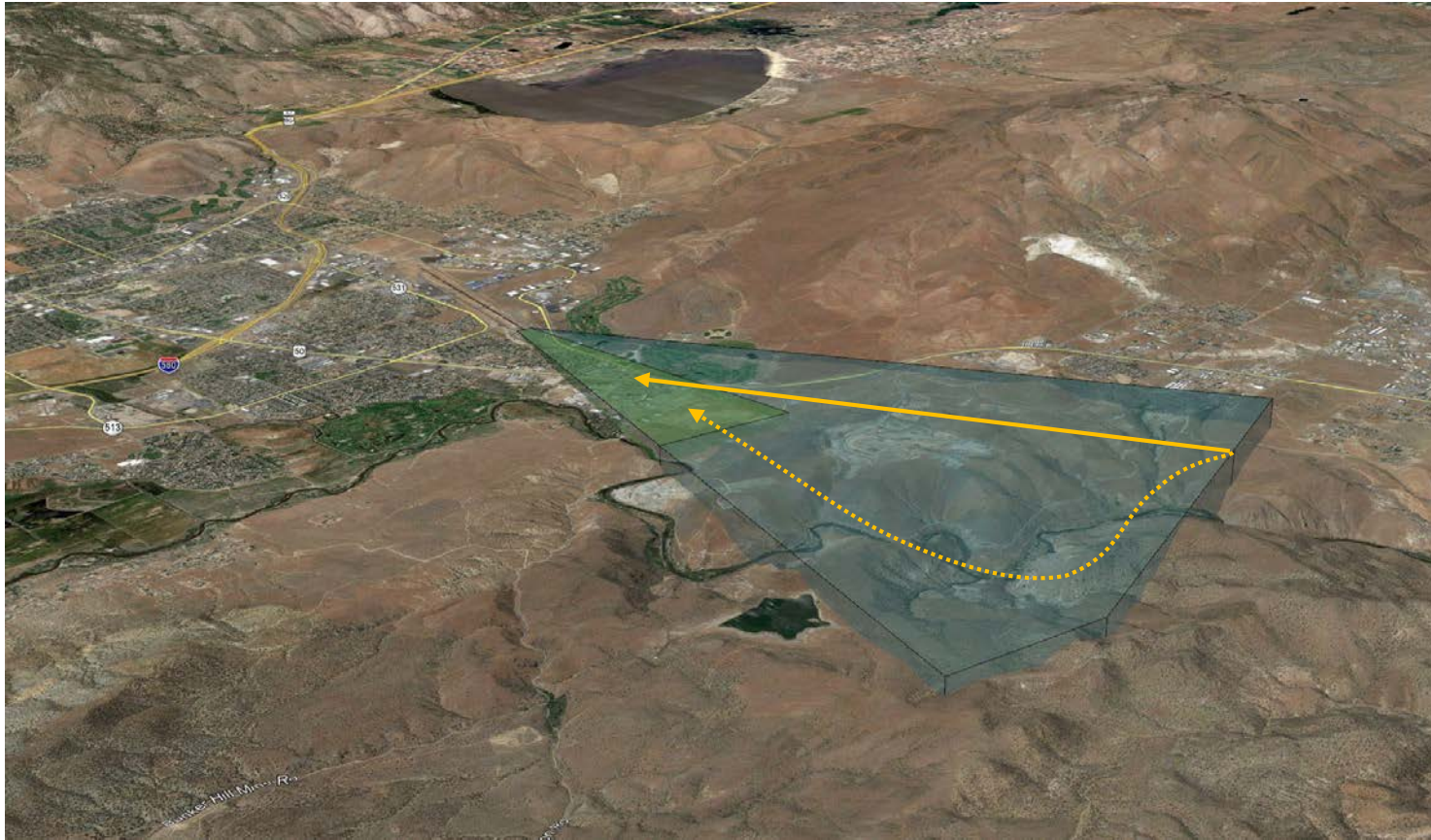
- (SP-07-268-15) Special request for night evaluation at Carson, Carson City NV. Evaluation completed UNSAT for SIAP use at night. Both the RNAV (GPS)-A AMDT 1 and RNAV (GPS) RWY 27 ORIG-A were evaluated and determined to have insufficient visual references at night with regard to surrounding unlit, high terrain. These environmental factors do not provide a pilot with the proper visual cues necessary to "see and avoid obstacles" as stated in the Aeronautical Information Manual section 5-4-20.b.1 once below the MDA. Conditions unique to the night time environment present a significant hazard during the visual maneuvering segment to execute a safe landing at night from an instrument approach. Runway 09 PAPIs are currently prohibited from night use.



Nighttime Restrictions RNAV (GPS) - A



1. Flight Inspection Crews Could Not Distinguish Terrain Along Circling Approach (North and South of Runway)



Nighttime Restrictions RNAV (GPS) - 27

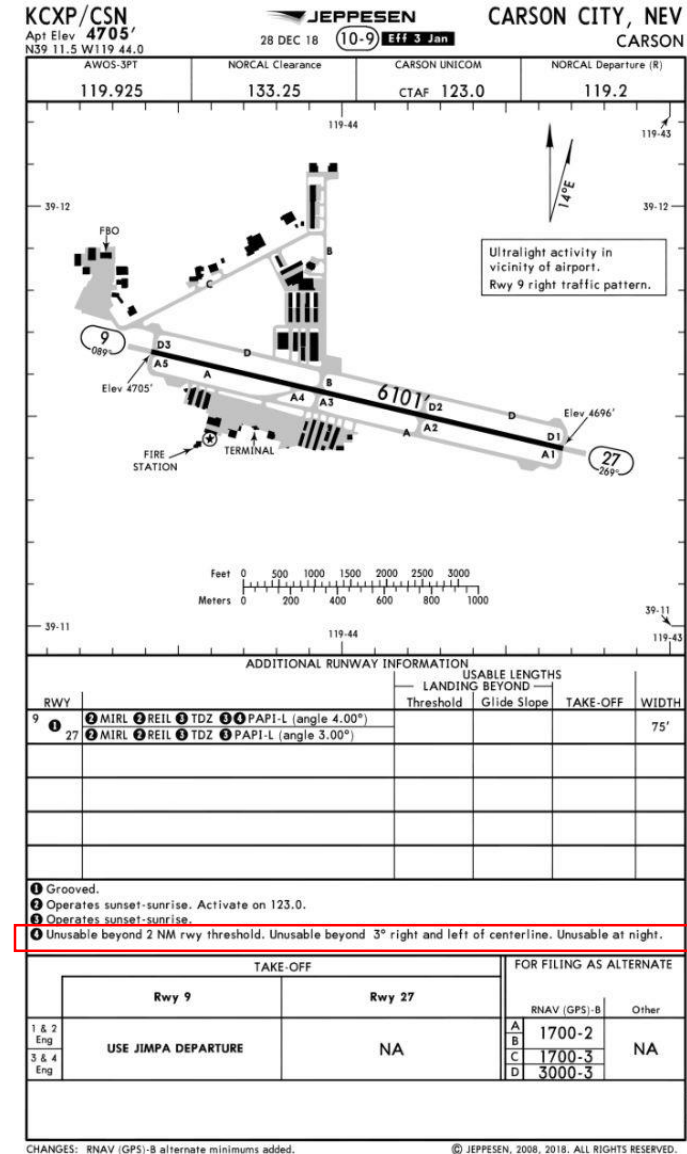
2. Flight Inspection Crews Could Not Distinguish Terrain Along Visual Portion of Offset Approach
3. No positive course guidance along circling or offset approach to assist pilots in avoiding terrain

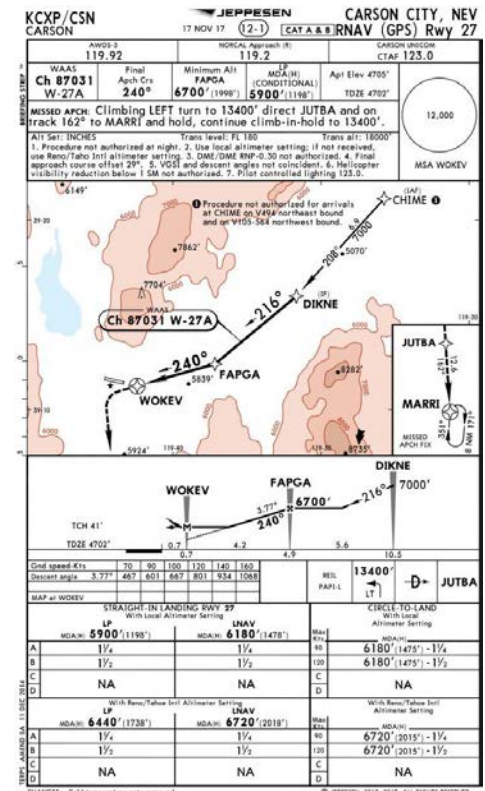
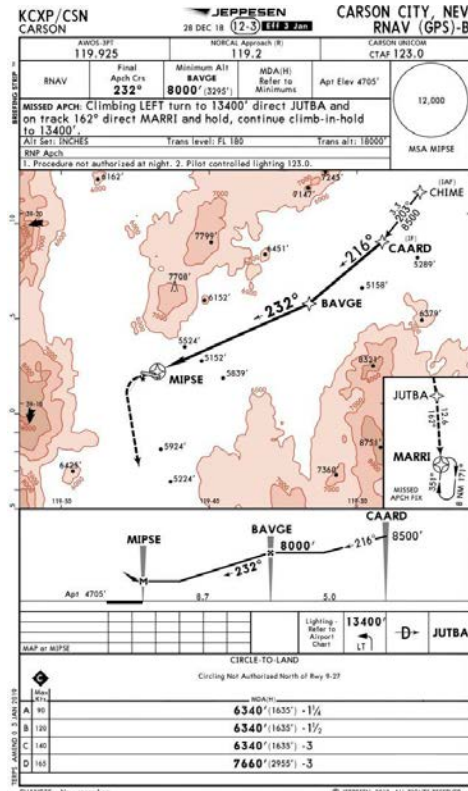
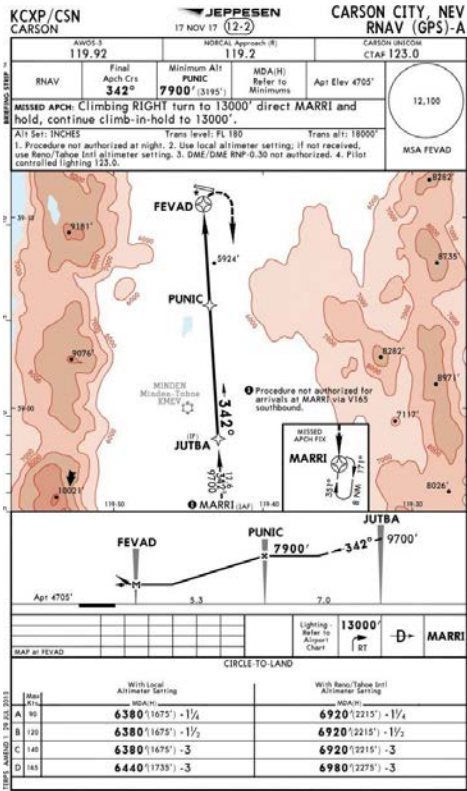
Aeronautical Data and Flight Procedures



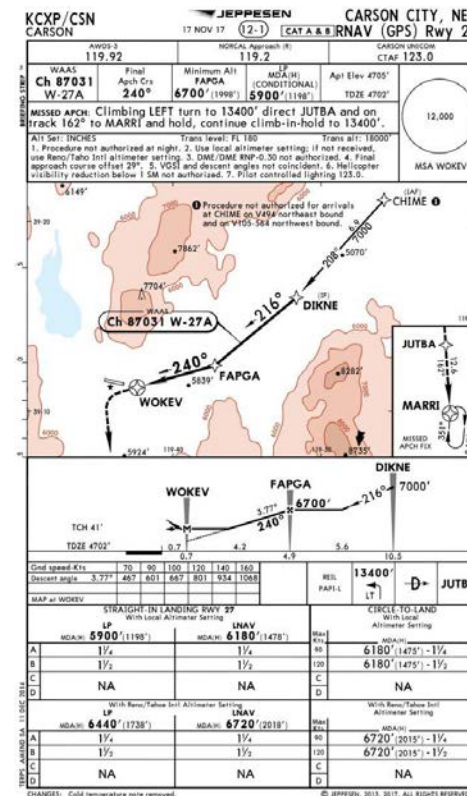
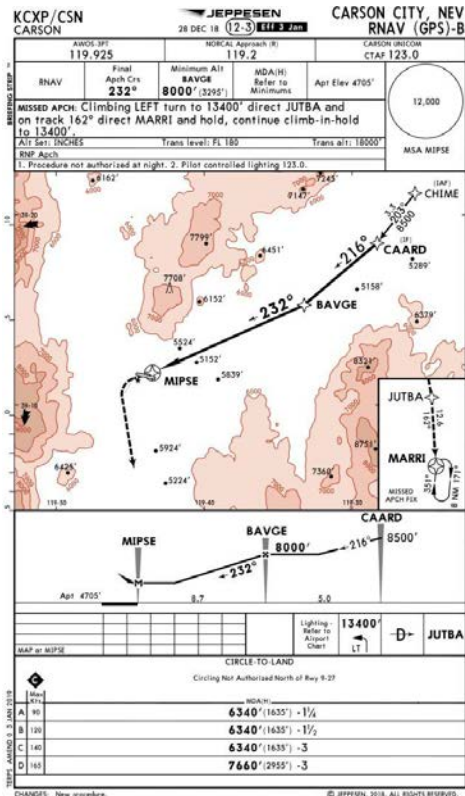
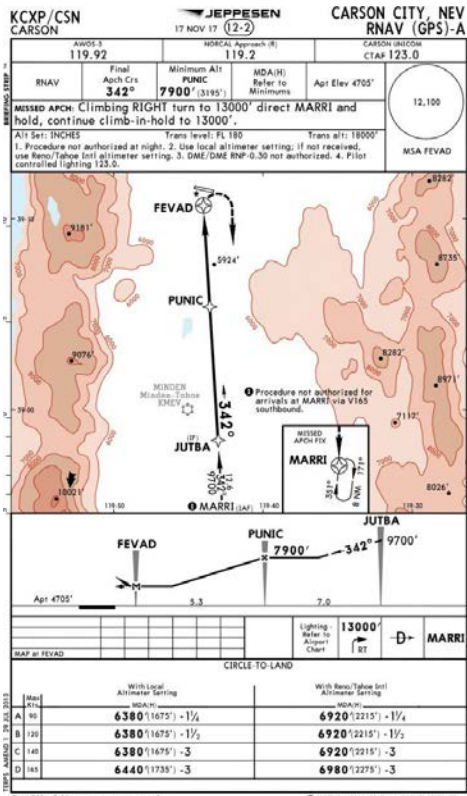
Aeronautical Data

- ✓ Runway 09/27 is marked and lighted to accommodate nighttime operations
- ✓ REILs create additional safety for nighttime ops
- ✓ AWOS-3PT enables 24/7/365 local weather reporting
- ✓ VGSI (PAPI) on runway 27 is sufficient for straight-in obstacle/terrain separation
- ✗ VGSI (PAPI) on runway 09 is not sufficient for straight-in obstacle/terrain separation at night





Existing Approaches



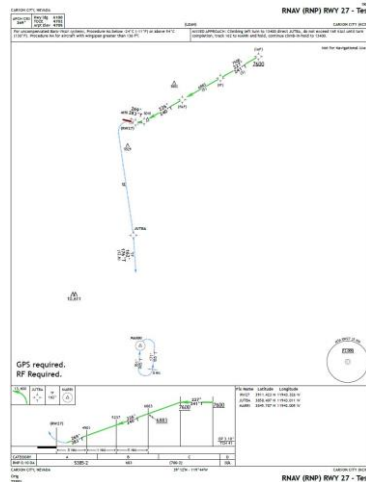
- x Old Circling Criteria
- x No limitation on Circling Extent
- ❑ Explore Obstacle Lighting or Circling Lights (ICAO Only)

- ✓ New Circling Criteria
- ✓ Limited Circling Extent
- ❑ Explore Obstacle Lighting
- ❑ Explore Extended Approach Lighting System

- ✓ CAT A-B Criteria Compliant
- x CAT C-D Can not be added due to offset >20 Deg
- x Old Circling Criteria
- ❑ Explore Extended Approach Lighting System

Future Approaches

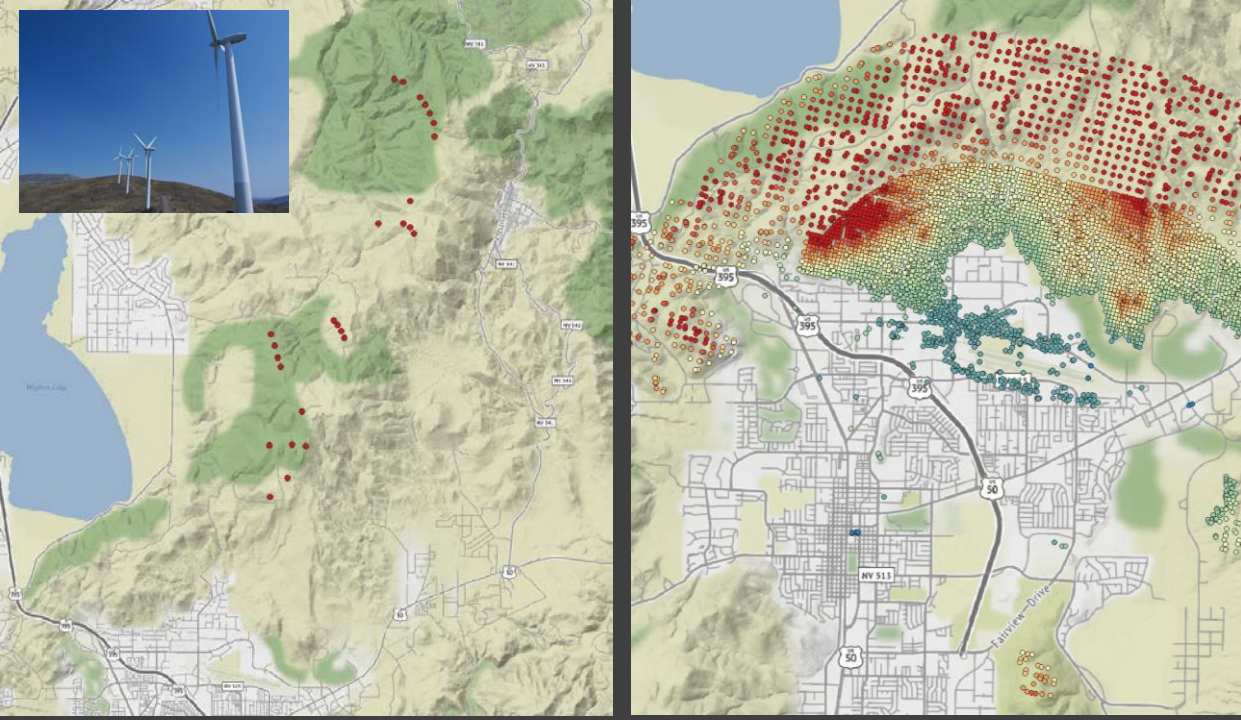
- ✓ CAT A – C Capable
- ✓ Supports 700ft – 2 Miles
- x RNP-AR Will Limit Utilization
- x Missed Approach Limited
- x Runway TCH Needs to Increase
- ❑ Would benefit from MALS or MALSF
- ❑ Would benefit from extended approach light system



- ❑ Potential to Consider LNAV to Extended Approach Light System “Fly Visual to Airport When Established on RLLS”



Geospatial Considerations



Geospatial

FAA AC-150-5300-18B VGA Survey

- Existing Obstacles

FAA DDOF

- Deconflicted Obstacles

FAA OE/AAA

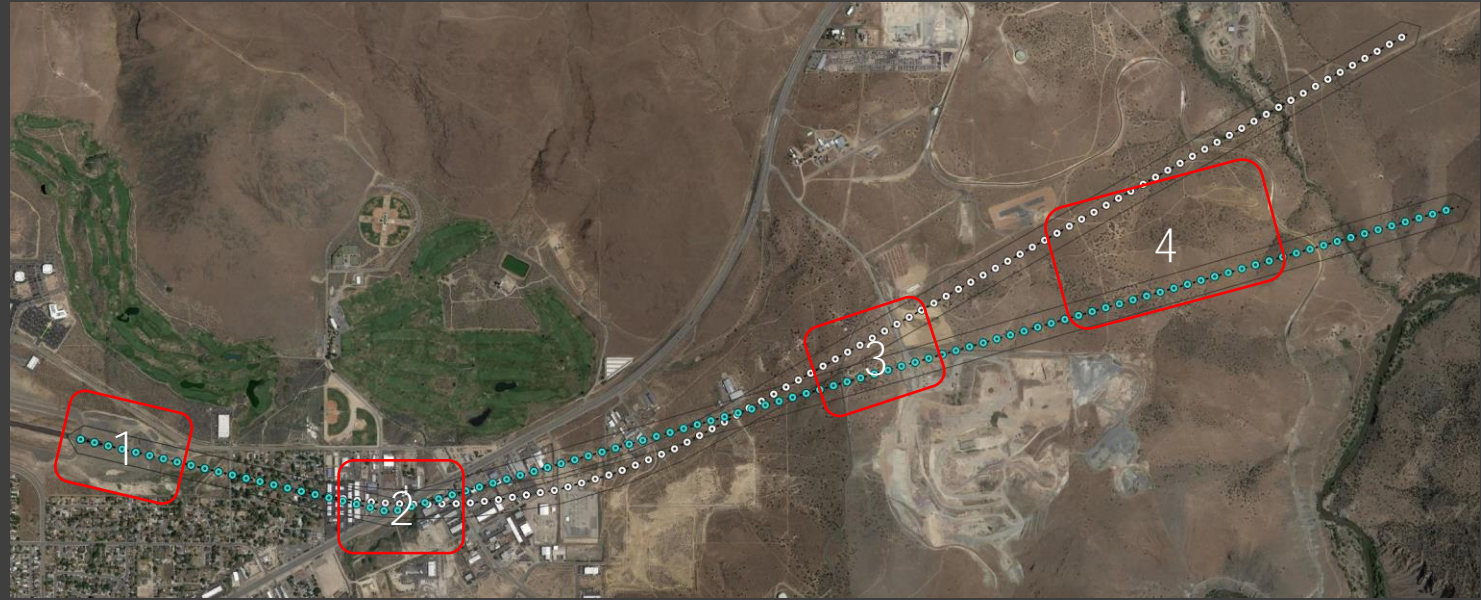
- Windfarm

Carson City GIS

- Building Heights
- Zoning



Possible Extended Approach Light System



- Used current and future approach centerlines as the basis for site exploration
- Explored current airport lighting and vault for solutions close to threshold
- Investigated offsite for available power and elevation



Site Assessment Existing Shelter and Transformer Vicinity





Site Assessment Array 1 and 2 Vicinity



Site Assessment Array 3 Vicinity

Site Assessment Array 4 Vicinity





Lighting Solutions



Obstacle Lights

Obstacle Lights

- 16 Obstacle Light Areas (Initial Estimate)
- Solar/LED
- 5 Year Replacement

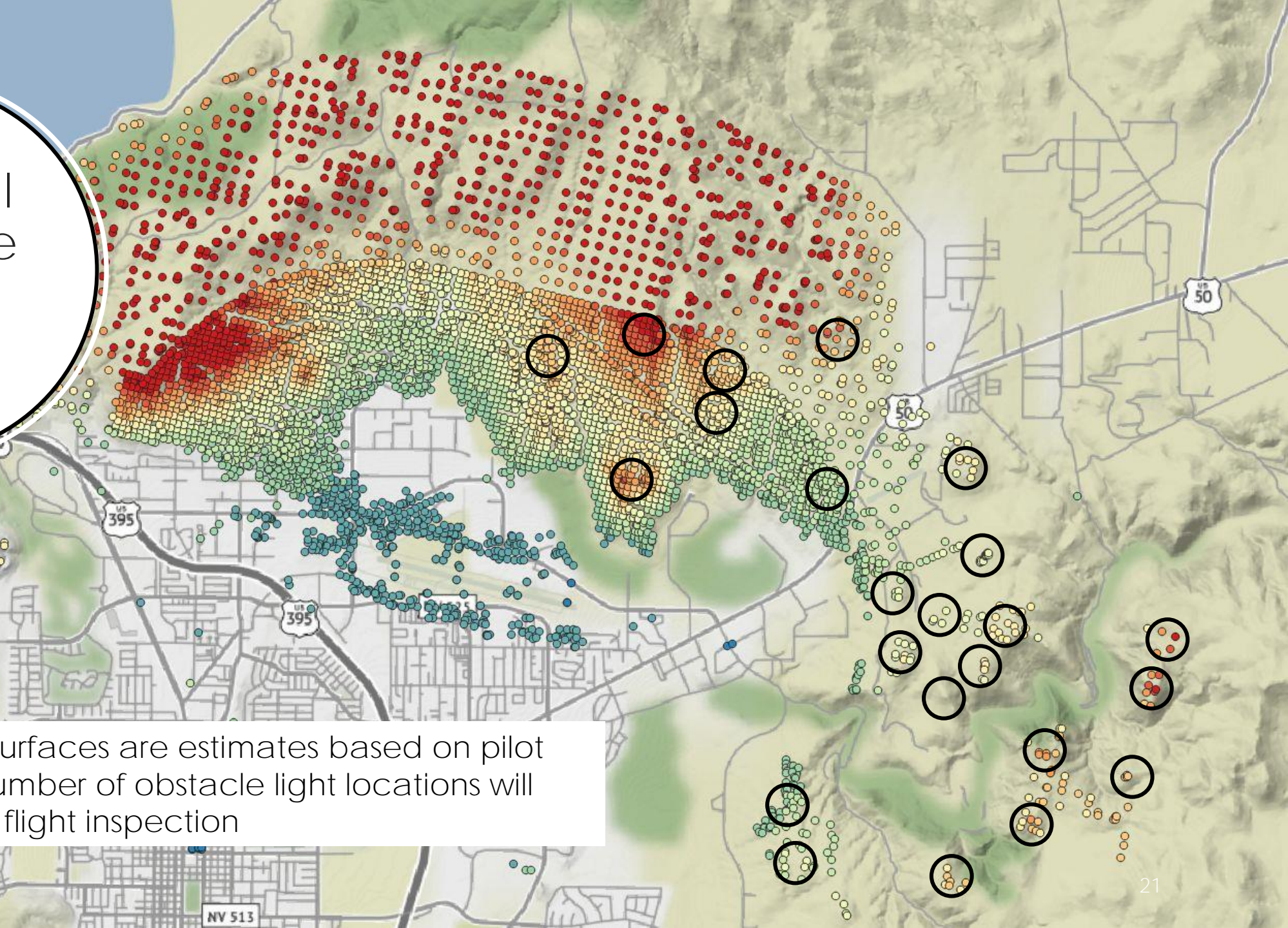
Benefits

- Illuminates highest terrain in visual segment of approach
- Provides terrain awareness in terminal area

Drawbacks

- Does not cover entire circling or terminal area
- Does not create obvious path to runway
- May not result in SAT for nighttime operations
- Can not be monitored from airport, without substantial cost
- Land must still be acquired for pole mount above vegetation

Potential Obstacle Light Areas



All Obstacle lighting surfaces are estimates based on pilot perception, actual number of obstacle light locations will require simulator and flight inspection

Extended Approach Light System

Runway Lead-In Light System (RLLS)

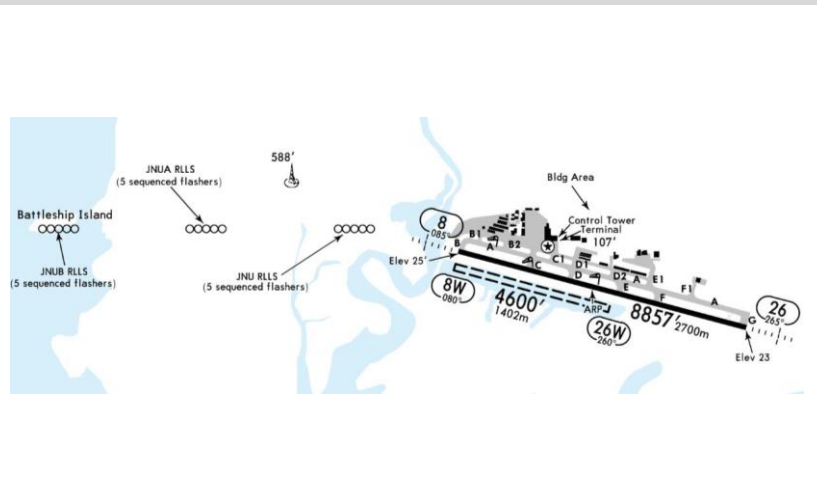
- Sequence of Lead-In (LDIN) Light arrays
- Used for challenging terrain separation, urban deconfliction and noise abatement

Benefits

- FAA can consider approach light credit with an RLLS, if applicable to procedure
- Can be used with by all pilot skill level
- Creates positive course guidance to runway

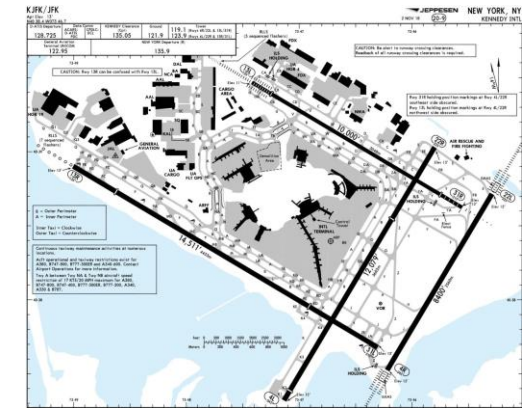
Challenges

- Off airport design
- Does not typically put terrain into perspective



Active FAA RLLS Installations

- 12 Active US RLLS Installations
- Most famous is New York (KJFK) Canarsie Approach
 - [YouTube Approach at Night](#)
- Juneau (PAJN) has one of the oldest continuous RLLS for offset LDA and RNAV approach to runway 08



| Airport | RWY | Lights | Visibility Credit | Off Airport |
|---------|-----|--------------------------------|-------------------|-------------|
| KRID | 24 | 5 (ODALS Flashing) | Yes | N |
| PAGB | 13 | Unknown | Unknown | N |
| KHOZ | 18 | 3 | No | N |
| KHOZ | 36 | 5 | No | N |
| KSRB | 4 | 4 | Yes | N |
| PAJN | 8 | 5, 5, 5 to MALSF | Yes (LNAV Only) | Y |
| KPWK | 16 | 21 (Arranged in MALSF Pattern) | No | N |
| KJFK | 13L | 7, 21, 5, 5 to ALSF-II | No | Y |
| KJFK | 13R | 7 | No | Y |
| KTRL | 17 | 6 | No | N |
| KMDW | 13C | 3 | No | N |
| KMDW | 31C | 3 | No | N |
| KMSY | 2 | 5 | No | N |
| KDPA | 10 | 5 | No | N |
| KSUE | 2 | 3 | No | N |

Lighting Solutions: RLLS Options

- All RLLS Options Consider

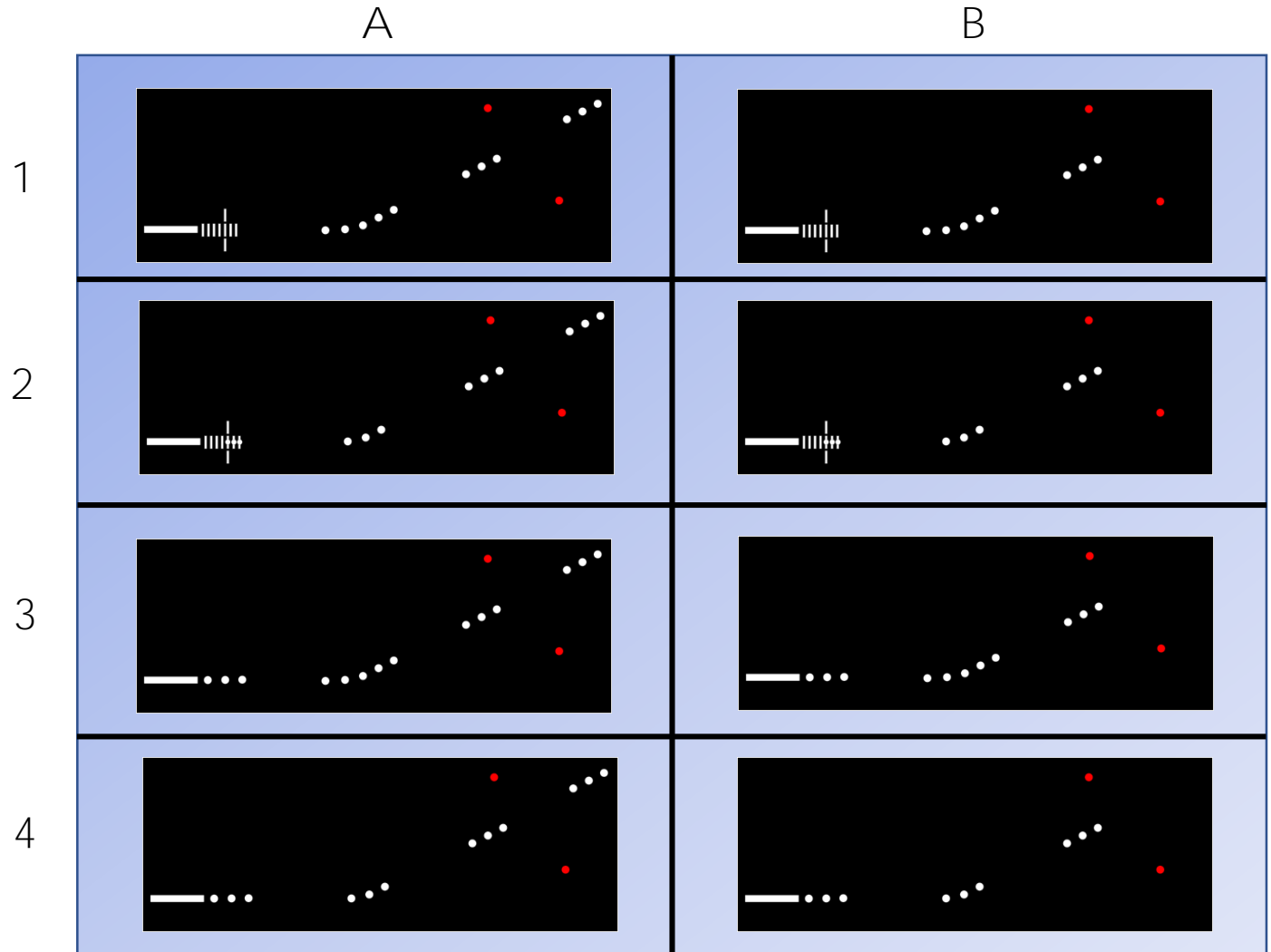
- LDIN or MALS at Runway Threshold
- 1 LDIN Array at Offset Flight Procedure Juncture
- 1 LDIN Near MDA
- 2 Obstacle Lights

- Primary Variations (1 – 4)

- At Runway Threshold
 - MALS
 - MALSF
 - 3 Light LDIN
- At Offset Flight Procedure Juncture
 - 3 Light LDIN
 - 5 Light LDIN

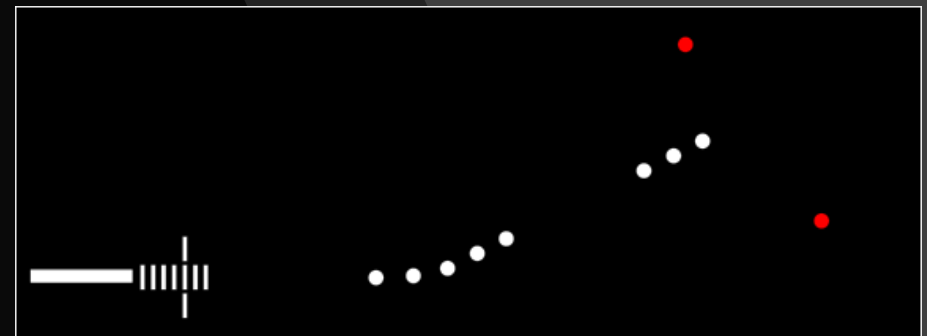
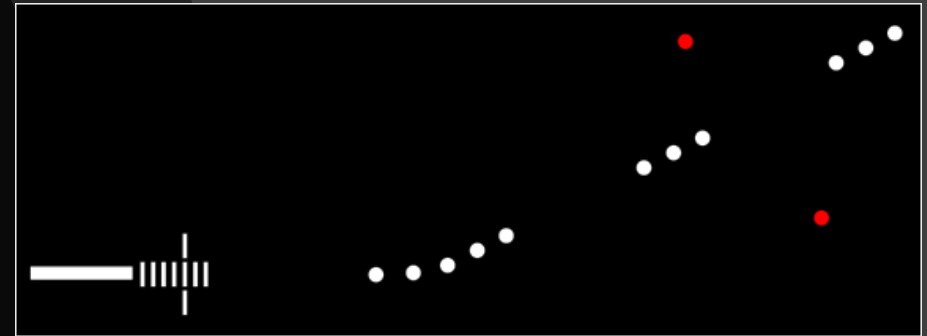
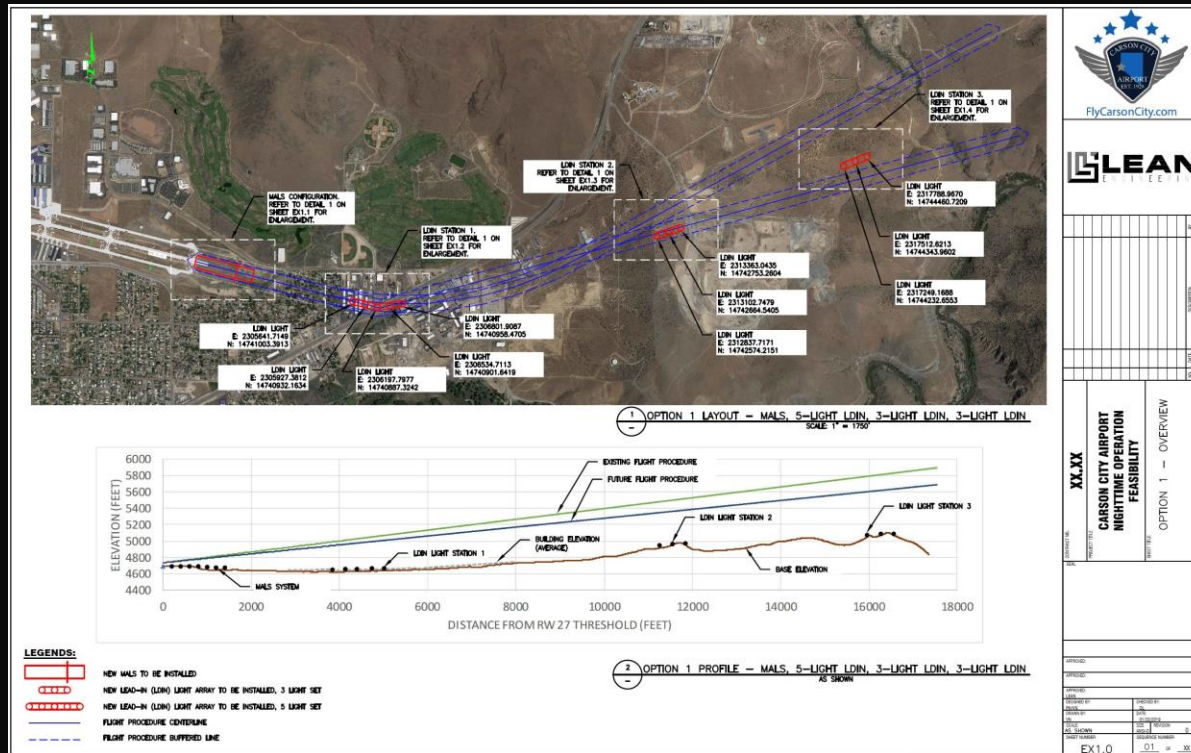
- Secondary Variations (A and B)

- Additional 3 Light LDIN at Future MDA for CAT C/D

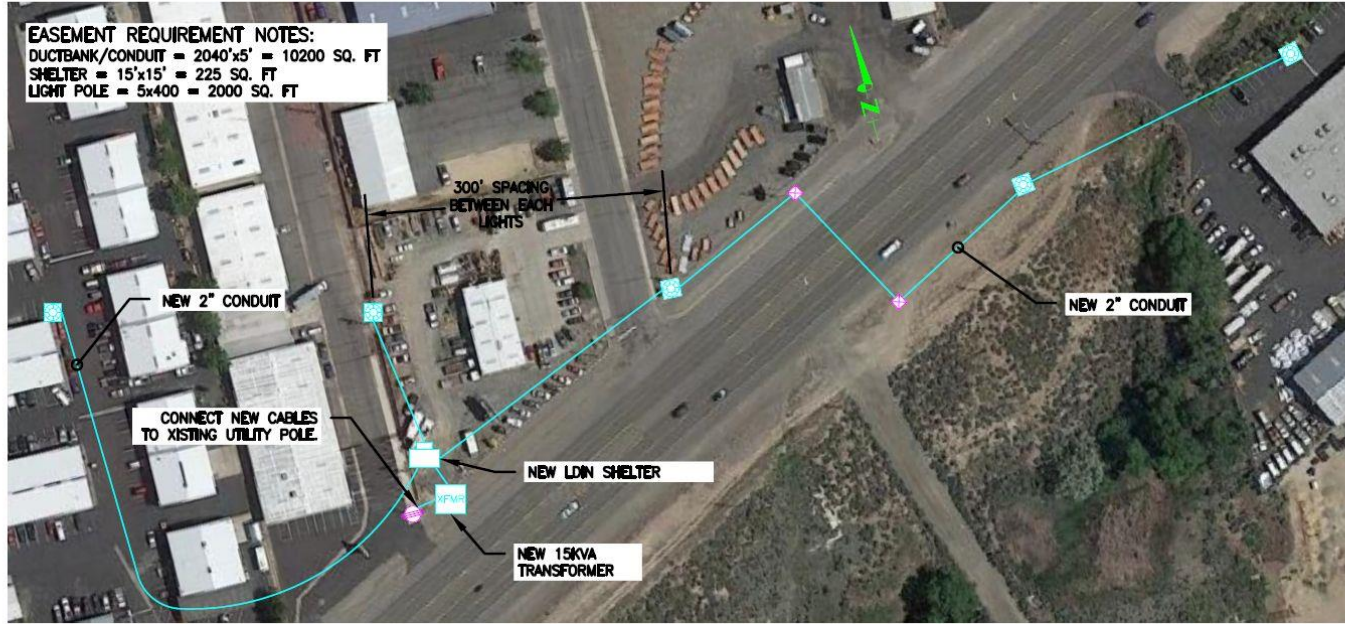


Option A1: MALS, 5xLDIN, 3xLDIN, 3xLDIN











Option B1: MALS, 5xLDIN, 3xLDIN



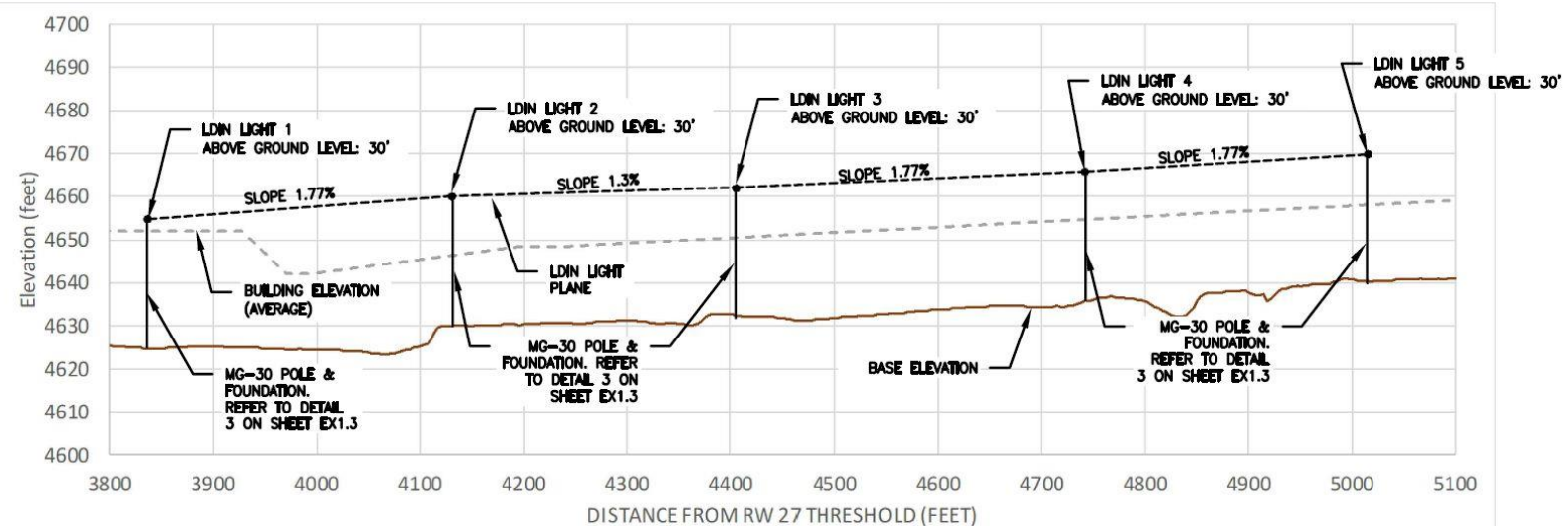
EASEMENT REQUIREMENT NOTES:
 DUCTBANK/CONDUIT = 2040'x5' = 10200 SQ. FT
 SHELTER = 15'x15' = 225 SQ. FT
 LIGHT POLE = 5'x400' = 2000 SQ. FT



LEGENDS:

-  2" CONDUIT
-  2W-4"C DUCTBANK
-  NEW MALS/MALSF 11-LIGHT BAR TO BE INSTALLED
-  NEW MALS/MALSF 5-LIGHT BAR TO BE INSTALLED
-  NEW MALSF FLASHING LIGHT TO BE INSTALLED
-  NEW LDIN LIGHT TO BE INSTALLED
-  NEW SHELTER
-  NEW TRANSFORMER
-  EXISTING UTILITY POLE
-  EXISTING HANDHOLE

① **LDIN STATION 1 ENLARGEMENT**
 SCALE: 1" = 150'



| NO. | DATE | DESCRIPTION | BY |
|-----|------|-------------|----|
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|------------------------------|--|---|
| CONTRACT NO. XX.XX | CARSON CITY AIRPORT NIGHTTIME OPERATION FEASIBILITY | SHEET TITLE OPTION 1 - LDIN STATION 1 ENLARGEMENT |
| SEAL | 26 | |
| APPROVED: | APPROVED: | |

ROM Cost Estimation

Direct Cost

- Power Elements
 - Lights
 - Cabling
 - Ductbank
 - Transformers
 - NV Energy Connections
- Control Elements
- Shelters/Fencing
- Foundations/Poles
- Solar Obstacle Lights

Design and Implementation Cost

- Testing and Commissioning
- Design and CM
- Flight Inspection
- Contingency

Limitations

- No estimated cost for property easements
- Final number, position and orientation of LDIN arrays will directly effect overall cost


Likelihood of FAA Nighttime Approval

Nighttime Approval Scale

- 10 – FAA is likely to issue nighttime operations with no additional cost or operational restrictions
- 7 – FAA is likely to issue nighttime operations with some additional cost or operational restrictions
- 5 – FAA may issue nighttime operations with some additional cost or operational restrictions
- 3 – FAA is unlikely to issue nighttime operations without additional design modification or restrictions
- 1 – FAA is Unlikely to issue nighttime operations

Limitations

- This scale is based on Lean's experience working on similar airspace and flight procedures challenges
- FAA has the final authority on whether nighttime flight operations can occur
 - Nighttime approval is granted based on the skill of the least trained/least experienced pilot that can fly to KCXP
 - There are few examples of RLLS in the US used for terrain separation with reduced obstacle lighting (PAJN)
- FAA Stakeholder Meeting is critical to further refine these estimates

| Feasibility Option | Drawing Set | RLS Configurations | | ROM Cost | Easement Area (ft ² / Acre) | Likelihood of Nighttime Approval | |
|--------------------|-------------|--------------------------------|---|-------------|--|----------------------------------|-----------|
| | | Components | Graphic | | | CAT A - B | CAT C - D |
| A1 | 1 | MALS, 5xLDIN, 3xLDIN, 3xLDIN |  | \$4,718,640 | 27475 / 0.63 | 9 | 8 |
| A2 | 2 | MALSF, 3xLDIN, 3xLDIN, 3xLDIN |  | \$4,464,360 | 21575 / 0.49 | 9 | 8 |
| A3 | 3 | 3xLDIN, 5xLDIN, 3xLDIN, 3xLDIN |  | \$3,949,560 | 27475 / 0.63 | 8 | 6 |
| A4 | 4 | 3xLDIN, 3xLDIN, 3xLDIN, 3xLDIN |  | \$3,678,900 | 21575 / 0.49 | 8 | 6 |
| B1 | 1 | MALS, 5xLDIN, 3xLDIN |  | \$4,112,580 | 18850 / 0.43 | 9 | 7 |
| B2 | 2 | MALSF, 3xLDIN, 3xLDIN |  | \$3,858,300 | 12950 / 0.29 | 9 | 7 |
| B3 | 3 | 3xLDIN, 5xLDIN, 3xLDIN |  | \$3,343,500 | 18850 / 0.43 | 6 | 5 |
| B4 | 4 | 3xLDIN, 3xLDIN, 3xLDIN |  | \$3,072,840 | 12950 / 0.29 | 6 | 5 |
| OL | NA | Obstacle Lights on Terrain | 16 Areas | \$2,122,800 | 25600 / 0.58 | 4 | 3 |

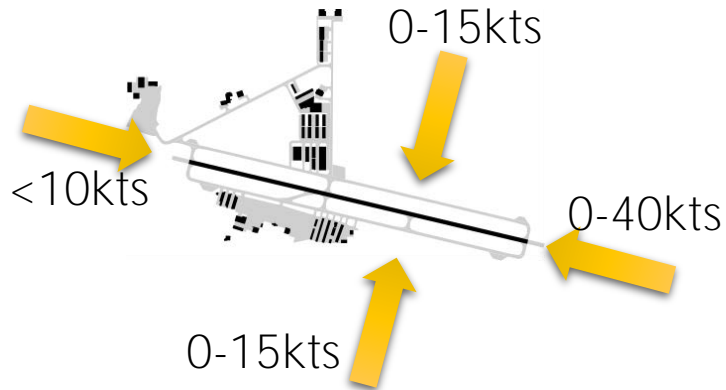
Overall Feasibility



Historical Weather and Operational Benefit

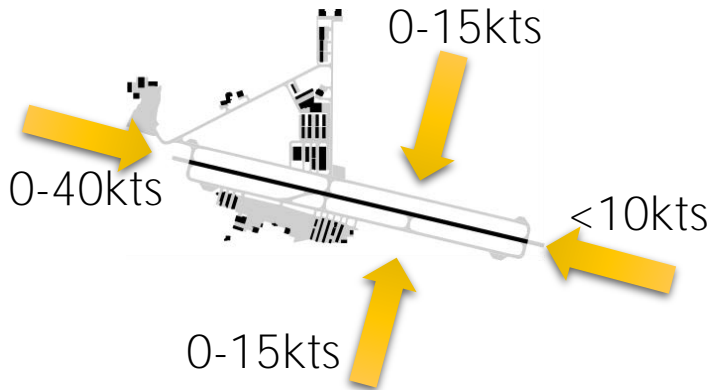
RWY 09 Capable of Supporting Operations

RWY 09 Wind



| | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|-------|--------|--------|--------|--------|--------|--------|---------|---------|--------|--------|--------|--------|
| 0:00 | 95.88% | 92.40% | 91.75% | 90.83% | 95.73% | 95.03% | 99.15% | 99.55% | 97.73% | 94.78% | 95.52% | 93.10% |
| 1:00 | 94.82% | 93.31% | 90.90% | 91.55% | 97.94% | 95.23% | 99.76% | 100.00% | 98.87% | 96.07% | 92.26% | 92.16% |
| 2:00 | 94.88% | 92.37% | 90.63% | 93.53% | 97.33% | 96.58% | 99.59% | 99.28% | 98.59% | 96.42% | 92.67% | 92.33% |
| 3:00 | 95.15% | 90.93% | 91.66% | 91.41% | 97.85% | 98.01% | 100.00% | 98.66% | 98.31% | 95.81% | 93.01% | 92.28% |
| 4:00 | 95.89% | 93.65% | 90.90% | 91.83% | 96.86% | 96.70% | 99.86% | 99.86% | 98.73% | 95.37% | 92.67% | 92.56% |
| 5:00 | 96.38% | 93.48% | 90.66% | 93.47% | 97.40% | 97.48% | 100.00% | 99.86% | 98.60% | 96.77% | 91.76% | 92.07% |
| 6:00 | 97.78% | 93.13% | 91.95% | 93.86% | 97.17% | 97.14% | 99.90% | 99.72% | 98.45% | 97.67% | 92.90% | 93.10% |
| 7:00 | 98.05% | 94.33% | 91.08% | 94.18% | 95.38% | 95.97% | 100.00% | 99.86% | 99.02% | 97.64% | 94.64% | 92.86% |
| 8:00 | 96.84% | 92.32% | 89.79% | 90.46% | 93.57% | 93.57% | 99.73% | 99.73% | 98.59% | 96.84% | 93.44% | 91.81% |
| 9:00 | 96.23% | 91.31% | 86.75% | 85.30% | 88.90% | 89.53% | 99.19% | 99.04% | 95.02% | 95.97% | 90.63% | 90.55% |
| 10:00 | 93.74% | 86.86% | 82.39% | 85.33% | 83.82% | 84.71% | 97.51% | 98.08% | 94.39% | 93.94% | 89.17% | 89.17% |
| 11:00 | 91.60% | 82.44% | 74.75% | 78.13% | 75.34% | 78.19% | 91.63% | 95.03% | 88.76% | 90.13% | 87.27% | 89.58% |
| 12:00 | 89.28% | 78.97% | 69.20% | 70.76% | 64.62% | 65.17% | 77.74% | 87.62% | 80.97% | 84.92% | 82.75% | 86.38% |
| 13:00 | 87.45% | 77.53% | 61.22% | 60.53% | 57.02% | 52.92% | 61.92% | 70.27% | 72.26% | 78.60% | 81.36% | 85.85% |
| 14:00 | 88.43% | 75.12% | 52.43% | 53.66% | 48.38% | 41.16% | 44.13% | 49.66% | 63.86% | 74.31% | 80.58% | 84.82% |
| 15:00 | 87.47% | 72.96% | 52.43% | 45.37% | 46.08% | 34.61% | 31.18% | 32.96% | 57.64% | 71.31% | 81.27% | 86.71% |
| 16:00 | 90.20% | 77.44% | 49.97% | 43.81% | 42.03% | 30.27% | 24.42% | 24.31% | 53.84% | 72.14% | 84.47% | 88.72% |
| 17:00 | 92.28% | 82.36% | 58.16% | 43.71% | 42.22% | 28.80% | 24.50% | 22.98% | 54.82% | 77.73% | 88.27% | 91.34% |
| 18:00 | 92.67% | 87.00% | 68.42% | 53.34% | 49.56% | 32.72% | 31.96% | 37.31% | 64.55% | 86.76% | 91.58% | 92.94% |
| 19:00 | 93.71% | 90.61% | 80.59% | 65.36% | 64.06% | 49.79% | 56.79% | 62.57% | 80.56% | 90.68% | 92.95% | 94.32% |
| 20:00 | 94.68% | 91.64% | 86.94% | 74.56% | 77.85% | 71.53% | 80.73% | 87.82% | 90.38% | 93.03% | 95.57% | 94.14% |
| 21:00 | 94.96% | 92.56% | 89.60% | 82.57% | 87.16% | 82.49% | 92.65% | 95.09% | 94.01% | 91.43% | 95.72% | 95.77% |
| 22:00 | 95.10% | 91.57% | 92.91% | 89.21% | 90.33% | 88.94% | 98.09% | 98.17% | 96.49% | 93.89% | 94.71% | 93.76% |
| 23:00 | 95.50% | 92.09% | 92.43% | 88.60% | 94.68% | 92.95% | 98.60% | 99.59% | 96.49% | 95.40% | 96.03% | 93.72% |
| Day | 91.93% | 82.93% | 69.83% | 67.05% | 67.73% | 63.07% | 67.19% | 69.94% | 76.98% | 84.87% | 86.56% | 88.64% |
| Night | 94.98% | 91.22% | 88.41% | 87.23% | 93.31% | 93.71% | 96.84% | 97.79% | 95.60% | 94.16% | 93.26% | 93.11% |
| 24 HR | 93.71% | 87.77% | 79.90% | 77.14% | 78.39% | 74.56% | 79.54% | 81.54% | 86.29% | 89.90% | 90.47% | 91.25% |

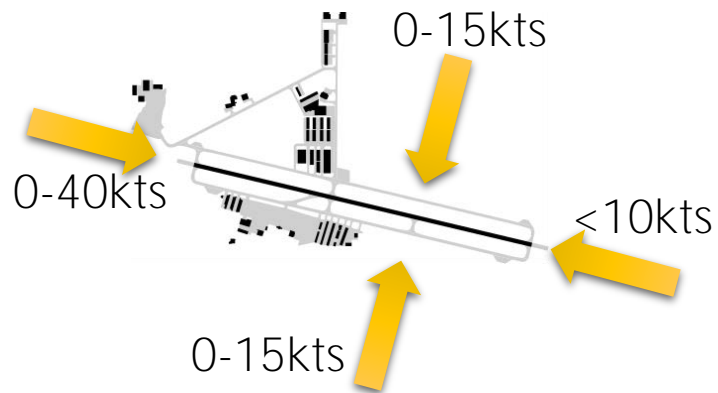
RWY 27 Capable of Supporting Operations



| | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|-------|--------|--------|--------|--------|--------|--------|---------|---------|--------|--------|--------|--------|
| 0:00 | 96.83% | 94.55% | 94.46% | 95.18% | 98.25% | 99.30% | 99.46% | 99.86% | 99.57% | 96.84% | 96.61% | 93.71% |
| 1:00 | 96.01% | 94.92% | 94.13% | 95.11% | 97.43% | 98.46% | 99.60% | 100.00% | 99.58% | 97.54% | 95.92% | 93.94% |
| 2:00 | 96.63% | 94.07% | 95.53% | 96.08% | 98.24% | 99.69% | 99.86% | 99.86% | 99.01% | 97.83% | 96.48% | 93.05% |
| 3:00 | 97.51% | 93.58% | 95.07% | 95.42% | 97.85% | 99.13% | 99.90% | 99.45% | 99.30% | 97.67% | 95.84% | 93.00% |
| 4:00 | 95.54% | 96.05% | 93.94% | 95.00% | 98.78% | 99.13% | 100.00% | 99.76% | 99.44% | 96.36% | 95.93% | 93.40% |
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| 6:00 | 97.65% | 95.08% | 93.70% | 96.43% | 99.06% | 99.30% | 100.00% | 100.00% | 99.58% | 97.78% | 94.20% | 94.98% |
| 7:00 | 96.61% | 96.17% | 93.86% | 96.49% | 97.44% | 98.23% | 100.00% | 99.86% | 99.72% | 98.09% | 94.71% | 94.62% |
| 8:00 | 95.99% | 93.98% | 92.72% | 93.17% | 97.06% | 96.41% | 99.76% | 99.59% | 99.30% | 97.15% | 93.03% | 93.73% |
| 9:00 | 94.83% | 92.38% | 87.88% | 87.20% | 94.03% | 93.43% | 99.59% | 99.04% | 97.63% | 95.41% | 91.09% | 90.71% |
| 10:00 | 91.61% | 89.39% | 85.24% | 89.39% | 90.34% | 89.90% | 99.32% | 99.14% | 95.91% | 92.21% | 89.34% | 86.69% |
| 11:00 | 90.00% | 85.12% | 83.42% | 84.68% | 87.42% | 90.98% | 98.50% | 98.17% | 94.87% | 89.89% | 84.84% | 85.38% |
| 12:00 | 85.18% | 76.50% | 81.98% | 82.15% | 87.56% | 90.89% | 97.02% | 95.74% | 91.14% | 83.33% | 74.20% | 79.89% |
| 13:00 | 78.71% | 77.37% | 78.98% | 77.75% | 86.44% | 91.59% | 96.19% | 95.20% | 82.23% | 75.86% | 66.55% | 75.03% |
| 14:00 | 70.68% | 72.57% | 74.56% | 79.47% | 84.34% | 87.40% | 94.75% | 96.24% | 81.29% | 75.24% | 63.10% | 72.47% |
| 15:00 | 68.96% | 73.66% | 74.73% | 78.72% | 87.15% | 88.93% | 93.51% | 93.91% | 81.87% | 66.79% | 69.19% | 71.64% |
| 16:00 | 78.85% | 76.32% | 75.81% | 79.11% | 86.59% | 90.22% | 92.90% | 93.27% | 80.67% | 68.35% | 79.35% | 85.61% |
| 17:00 | 90.72% | 85.08% | 78.28% | 78.72% | 85.82% | 91.78% | 94.14% | 96.07% | 81.31% | 72.34% | 89.66% | 91.60% |
| 18:00 | 94.73% | 90.04% | 84.19% | 83.20% | 88.78% | 92.24% | 95.14% | 96.71% | 86.98% | 83.62% | 92.78% | 93.88% |
| 19:00 | 96.19% | 91.87% | 90.21% | 87.11% | 94.03% | 94.37% | 97.71% | 97.88% | 93.70% | 92.00% | 94.69% | 95.10% |
| 20:00 | 95.99% | 94.56% | 93.14% | 90.52% | 94.50% | 96.32% | 96.85% | 98.12% | 98.22% | 96.26% | 95.12% | 93.51% |
| 21:00 | 97.21% | 93.64% | 93.91% | 93.99% | 95.48% | 97.43% | 99.73% | 99.14% | 97.59% | 95.87% | 94.48% | 95.24% |
| 22:00 | 96.40% | 94.53% | 95.63% | 92.81% | 96.00% | 98.74% | 99.42% | 99.59% | 98.44% | 97.31% | 95.23% | 94.21% |
| 23:00 | 97.41% | 94.28% | 95.52% | 93.65% | 95.97% | 98.50% | 99.73% | 100.00% | 98.58% | 96.95% | 95.93% | 93.46% |
| Day | 85.14% | 83.35% | 82.50% | 84.17% | 90.43% | 92.80% | 97.04% | 97.20% | 89.41% | 83.15% | 80.54% | 83.58% |
| Night | 96.15% | 93.41% | 93.21% | 93.90% | 97.14% | 98.84% | 99.45% | 99.58% | 98.56% | 95.69% | 94.78% | 93.77% |
| 24 HR | 91.57% | 89.22% | 88.30% | 89.03% | 93.23% | 95.06% | 98.04% | 98.19% | 93.99% | 89.94% | 88.85% | 89.52% |

Likelihood That Aircraft Will Land

CAT B - 1500ft – 1 1/2 Miles

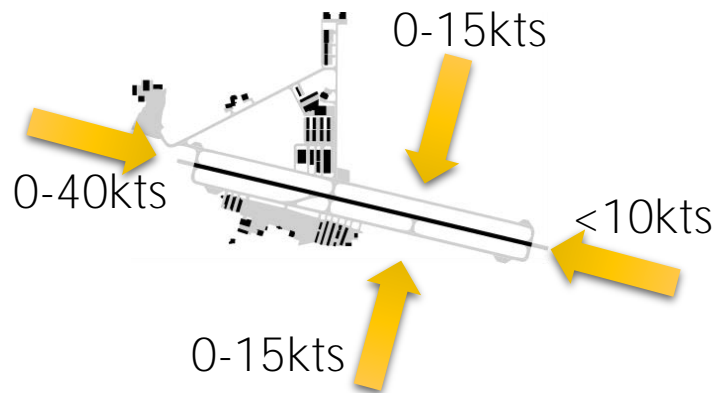


RWY 27 LNAV Overall Efficiency (CAT B)

| | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|-------|--------|--------|--------|--------|--------|--------|---------|---------|--------|--------|--------|--------|
| 0:00 | 91.93% | 92.40% | 92.97% | 95.04% | 97.85% | 99.30% | 99.46% | 99.86% | 99.57% | 96.57% | 95.63% | 91.88% |
| 1:00 | 91.65% | 92.32% | 92.17% | 95.11% | 97.02% | 98.46% | 99.60% | 100.00% | 99.58% | 97.26% | 94.84% | 90.94% |
| 2:00 | 91.20% | 91.14% | 92.76% | 95.37% | 98.11% | 99.69% | 99.86% | 99.86% | 99.01% | 97.42% | 94.63% | 90.46% |
| 3:00 | 91.56% | 90.05% | 92.94% | 94.75% | 97.72% | 99.13% | 99.90% | 99.45% | 99.30% | 96.70% | 94.24% | 90.45% |
| 4:00 | 89.99% | 92.68% | 91.68% | 94.16% | 98.24% | 99.13% | 100.00% | 99.76% | 99.44% | 94.86% | 94.51% | 89.79% |
| 5:00 | 89.97% | 92.44% | 90.29% | 95.30% | 97.94% | 99.16% | 100.00% | 100.00% | 99.72% | 96.39% | 92.87% | 89.64% |
| 6:00 | 90.01% | 92.82% | 92.18% | 96.43% | 98.52% | 99.30% | 100.00% | 99.72% | 99.58% | 96.80% | 93.07% | 89.78% |
| 7:00 | 88.44% | 93.07% | 91.15% | 95.79% | 97.14% | 98.23% | 99.73% | 98.66% | 99.72% | 96.19% | 93.13% | 88.61% |
| 8:00 | 87.79% | 91.09% | 90.27% | 92.75% | 96.41% | 96.41% | 99.35% | 98.22% | 99.30% | 94.71% | 91.64% | 87.27% |
| 9:00 | 87.95% | 89.28% | 86.32% | 86.78% | 93.76% | 93.43% | 99.46% | 97.52% | 97.63% | 93.31% | 90.53% | 84.79% |
| 10:00 | 85.14% | 86.78% | 83.44% | 88.97% | 90.34% | 89.90% | 99.32% | 98.18% | 95.91% | 91.14% | 88.74% | 81.93% |
| 11:00 | 83.16% | 84.34% | 81.79% | 83.80% | 87.42% | 90.84% | 98.37% | 98.17% | 94.87% | 89.75% | 84.11% | 81.62% |
| 12:00 | 79.96% | 75.73% | 81.17% | 81.17% | 87.43% | 90.65% | 96.88% | 95.74% | 91.14% | 83.06% | 73.21% | 76.56% |
| 13:00 | 73.56% | 76.44% | 78.03% | 77.32% | 86.30% | 91.59% | 95.64% | 95.20% | 82.09% | 75.31% | 65.72% | 72.08% |
| 14:00 | 66.89% | 72.22% | 72.74% | 79.33% | 84.03% | 87.12% | 94.47% | 95.83% | 81.15% | 75.10% | 62.36% | 68.46% |
| 15:00 | 64.26% | 73.50% | 72.71% | 78.54% | 86.75% | 88.93% | 93.24% | 93.64% | 81.87% | 66.52% | 68.91% | 66.09% |
| 16:00 | 73.35% | 74.62% | 74.70% | 78.86% | 86.35% | 89.80% | 92.49% | 92.99% | 80.67% | 68.22% | 79.07% | 81.56% |
| 17:00 | 88.24% | 83.70% | 77.74% | 78.44% | 85.68% | 91.64% | 93.19% | 95.66% | 81.03% | 72.20% | 88.79% | 90.25% |
| 18:00 | 92.67% | 87.43% | 82.46% | 82.78% | 88.78% | 92.24% | 95.14% | 96.30% | 86.98% | 83.62% | 92.22% | 92.00% |
| 19:00 | 93.54% | 90.18% | 88.99% | 87.11% | 93.93% | 94.37% | 97.03% | 97.34% | 93.70% | 92.00% | 94.13% | 92.34% |
| 20:00 | 93.18% | 92.25% | 91.12% | 90.52% | 94.50% | 96.32% | 96.34% | 97.71% | 98.22% | 96.26% | 94.70% | 90.54% |
| 21:00 | 93.05% | 92.41% | 91.45% | 93.99% | 95.48% | 97.43% | 99.73% | 99.14% | 97.59% | 95.87% | 93.61% | 93.08% |
| 22:00 | 93.52% | 92.99% | 93.76% | 92.55% | 96.00% | 98.74% | 99.42% | 99.59% | 98.44% | 97.31% | 94.21% | 92.81% |
| 23:00 | 93.86% | 92.13% | 94.31% | 92.98% | 95.83% | 98.50% | 99.73% | 100.00% | 98.58% | 96.81% | 94.68% | 92.03% |
| Day | 79.05% | 81.71% | 80.91% | 83.71% | 90.20% | 92.72% | 96.74% | 96.66% | 89.36% | 82.32% | 79.74% | 78.90% |
| Night | 91.74% | 91.07% | 91.31% | 93.61% | 96.87% | 98.84% | 99.40% | 99.54% | 98.56% | 95.22% | 93.72% | 91.14% |
| 24 HR | 86.45% | 87.17% | 86.55% | 88.66% | 92.98% | 95.01% | 97.85% | 97.86% | 93.96% | 89.31% | 87.90% | 86.04% |

Likelihood That Aircraft Will Land

CAT B - 1200ft – 1 1/2 Miles

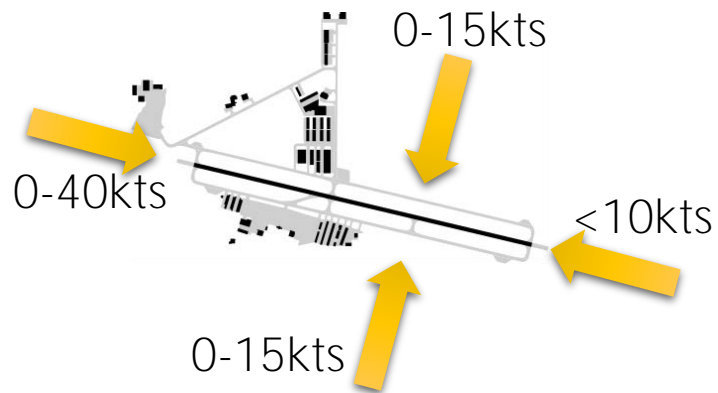


RWY 27 LP Overall Efficiency (CAT B)

| | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|-------|--------|--------|--------|--------|--------|--------|---------|---------|--------|--------|--------|--------|
| 0:00 | 92.61% | 92.40% | 93.10% | 95.04% | 98.25% | 99.30% | 99.46% | 99.86% | 99.57% | 96.57% | 95.63% | 92.04% |
| 1:00 | 92.33% | 92.32% | 92.17% | 95.11% | 97.02% | 98.46% | 99.60% | 100.00% | 99.58% | 97.40% | 94.84% | 91.10% |
| 2:00 | 92.16% | 91.29% | 92.76% | 95.37% | 98.11% | 99.69% | 99.86% | 99.86% | 99.01% | 97.42% | 95.05% | 90.46% |
| 3:00 | 92.65% | 90.35% | 93.34% | 95.03% | 97.72% | 99.13% | 99.90% | 99.45% | 99.30% | 96.70% | 94.66% | 90.75% |
| 4:00 | 90.71% | 92.80% | 92.08% | 94.58% | 98.24% | 99.13% | 100.00% | 99.76% | 99.44% | 94.86% | 94.96% | 90.17% |
| 5:00 | 91.61% | 92.59% | 90.29% | 95.30% | 98.89% | 99.16% | 100.00% | 100.00% | 99.72% | 96.39% | 92.98% | 89.75% |
| 6:00 | 91.10% | 92.82% | 92.18% | 96.43% | 98.65% | 99.30% | 100.00% | 99.72% | 99.58% | 96.80% | 93.46% | 90.91% |
| 7:00 | 88.99% | 93.07% | 91.15% | 95.79% | 97.14% | 98.23% | 99.73% | 98.79% | 99.72% | 96.32% | 93.23% | 90.38% |
| 8:00 | 88.07% | 91.09% | 90.27% | 92.75% | 96.92% | 96.41% | 99.35% | 98.22% | 99.30% | 95.12% | 91.64% | 88.18% |
| 9:00 | 88.77% | 89.62% | 86.45% | 87.20% | 93.89% | 93.43% | 99.46% | 97.52% | 97.63% | 93.45% | 90.53% | 85.70% |
| 10:00 | 85.69% | 87.25% | 83.44% | 89.39% | 90.34% | 89.90% | 99.32% | 98.18% | 95.91% | 91.14% | 88.74% | 82.38% |
| 11:00 | 84.42% | 84.65% | 81.79% | 83.80% | 87.42% | 90.84% | 98.37% | 98.17% | 94.87% | 89.75% | 84.11% | 81.62% |
| 12:00 | 80.64% | 76.04% | 81.57% | 81.17% | 87.43% | 90.65% | 96.88% | 95.74% | 91.14% | 83.06% | 73.35% | 76.56% |
| 13:00 | 74.28% | 76.75% | 78.03% | 77.32% | 86.30% | 91.59% | 95.64% | 95.20% | 82.09% | 75.45% | 65.86% | 72.08% |
| 14:00 | 67.02% | 72.57% | 73.05% | 79.33% | 84.03% | 87.12% | 94.47% | 95.83% | 81.15% | 75.10% | 62.36% | 68.46% |
| 15:00 | 64.95% | 73.50% | 73.11% | 78.54% | 86.75% | 88.93% | 93.24% | 93.64% | 81.87% | 66.52% | 68.91% | 66.24% |
| 16:00 | 73.76% | 74.62% | 74.70% | 78.86% | 86.35% | 89.80% | 92.49% | 92.99% | 80.67% | 68.22% | 79.07% | 81.71% |
| 17:00 | 89.07% | 83.70% | 77.74% | 78.58% | 85.68% | 91.64% | 93.19% | 95.66% | 81.03% | 72.20% | 88.93% | 90.25% |
| 18:00 | 93.49% | 87.58% | 82.46% | 83.06% | 88.78% | 92.24% | 95.14% | 96.30% | 86.98% | 83.62% | 92.22% | 92.30% |
| 19:00 | 94.37% | 90.18% | 88.99% | 87.11% | 93.93% | 94.37% | 97.03% | 97.34% | 93.70% | 92.00% | 94.13% | 92.49% |
| 20:00 | 94.00% | 92.25% | 91.12% | 90.52% | 94.50% | 96.32% | 96.34% | 97.71% | 98.22% | 96.26% | 94.98% | 90.73% |
| 21:00 | 93.87% | 92.41% | 91.45% | 93.99% | 95.48% | 97.43% | 99.73% | 99.14% | 97.59% | 95.87% | 93.75% | 93.08% |
| 22:00 | 93.79% | 92.99% | 93.76% | 92.55% | 96.00% | 98.74% | 99.42% | 99.59% | 98.44% | 97.31% | 94.35% | 93.00% |
| 23:00 | 94.41% | 92.13% | 94.31% | 93.37% | 95.97% | 98.50% | 99.73% | 100.00% | 98.58% | 96.81% | 94.82% | 92.03% |
| Day | 79.66% | 81.92% | 81.03% | 83.82% | 90.26% | 92.72% | 96.74% | 96.67% | 89.36% | 82.39% | 79.78% | 79.33% |
| Night | 92.58% | 91.13% | 91.39% | 93.70% | 97.02% | 98.84% | 99.40% | 99.54% | 98.56% | 95.23% | 93.91% | 91.36% |
| 24 HR | 87.20% | 87.29% | 86.64% | 88.76% | 93.07% | 95.01% | 97.85% | 97.86% | 93.96% | 89.35% | 88.02% | 86.35% |

Likelihood That Aircraft Will Land

CAT C - 700ft – 2 Miles



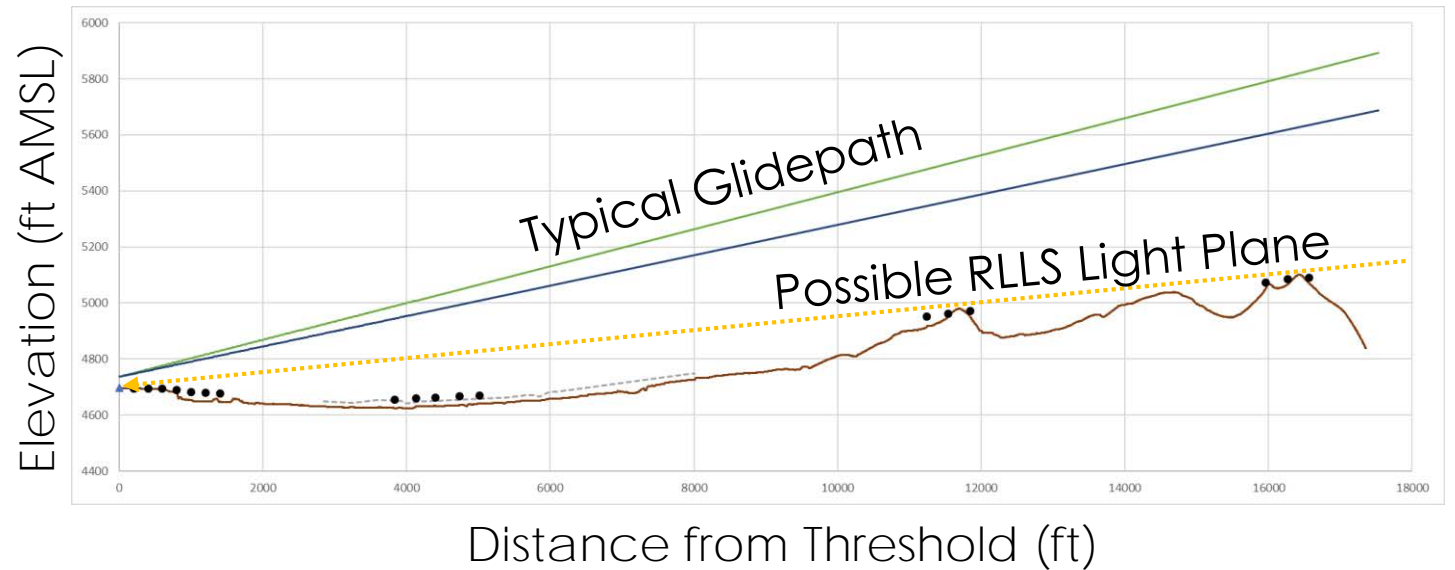
RWY 27 RNP or Future Approach to LDIN Overall Efficiency

| | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|-------|--------|--------|--------|--------|--------|--------|---------|---------|--------|--------|--------|--------|
| 0:00 | 93.43% | 92.86% | 93.24% | 95.04% | 98.25% | 99.30% | 99.46% | 99.86% | 99.57% | 96.57% | 95.73% | 92.53% |
| 1:00 | 93.29% | 92.47% | 92.62% | 95.11% | 97.43% | 98.46% | 99.60% | 100.00% | 99.58% | 97.40% | 95.11% | 92.31% |
| 2:00 | 92.85% | 91.64% | 93.15% | 95.37% | 98.24% | 99.69% | 99.86% | 99.86% | 99.01% | 97.42% | 95.05% | 91.22% |
| 3:00 | 93.10% | 90.97% | 93.34% | 95.03% | 97.85% | 99.13% | 99.90% | 99.45% | 99.30% | 96.70% | 94.83% | 91.44% |
| 4:00 | 91.71% | 94.19% | 92.18% | 94.58% | 98.78% | 99.13% | 100.00% | 99.76% | 99.44% | 94.99% | 94.96% | 90.51% |
| 5:00 | 93.24% | 93.06% | 90.29% | 95.44% | 98.89% | 99.16% | 100.00% | 100.00% | 99.72% | 96.53% | 93.26% | 90.51% |
| 6:00 | 92.56% | 93.55% | 92.32% | 96.43% | 98.79% | 99.30% | 100.00% | 99.45% | 99.58% | 96.80% | 93.46% | 91.37% |
| 7:00 | 90.77% | 93.53% | 91.42% | 95.90% | 97.17% | 98.23% | 99.73% | 98.21% | 99.72% | 96.32% | 93.41% | 91.02% |
| 8:00 | 89.81% | 90.78% | 90.27% | 92.75% | 96.92% | 96.41% | 99.35% | 97.81% | 99.30% | 95.12% | 91.81% | 89.20% |
| 9:00 | 90.31% | 89.78% | 86.35% | 87.20% | 93.89% | 93.43% | 99.46% | 96.83% | 97.63% | 93.45% | 90.81% | 86.65% |
| 10:00 | 87.35% | 87.40% | 83.58% | 89.39% | 90.34% | 89.90% | 99.32% | 97.77% | 95.91% | 91.27% | 89.03% | 82.80% |
| 11:00 | 85.95% | 84.65% | 81.93% | 83.70% | 87.42% | 90.84% | 98.37% | 97.90% | 94.87% | 89.89% | 84.11% | 81.92% |
| 12:00 | 82.28% | 76.31% | 81.57% | 81.35% | 87.43% | 90.65% | 96.88% | 95.74% | 91.14% | 83.06% | 73.35% | 76.40% |
| 13:00 | 75.24% | 76.44% | 78.44% | 77.32% | 86.17% | 91.59% | 95.64% | 95.20% | 82.09% | 75.45% | 65.75% | 72.08% |
| 14:00 | 67.44% | 72.41% | 73.46% | 79.33% | 83.90% | 87.12% | 94.47% | 95.83% | 81.15% | 74.69% | 62.22% | 68.65% |
| 15:00 | 64.95% | 73.04% | 72.98% | 78.54% | 86.75% | 88.93% | 93.24% | 93.64% | 81.87% | 66.52% | 69.05% | 66.50% |
| 16:00 | 74.31% | 74.62% | 74.70% | 78.86% | 86.45% | 89.80% | 92.49% | 92.99% | 80.67% | 68.22% | 79.07% | 81.45% |
| 17:00 | 88.93% | 83.70% | 77.74% | 78.58% | 85.41% | 91.64% | 93.05% | 95.66% | 81.03% | 71.93% | 88.93% | 90.55% |
| 18:00 | 93.49% | 88.04% | 82.70% | 83.06% | 88.78% | 92.24% | 95.14% | 96.30% | 86.84% | 83.62% | 92.22% | 92.42% |
| 19:00 | 94.64% | 89.99% | 89.13% | 87.11% | 93.93% | 94.37% | 97.03% | 97.34% | 93.70% | 92.00% | 94.13% | 93.23% |
| 20:00 | 93.96% | 92.25% | 91.12% | 90.52% | 94.50% | 95.90% | 96.34% | 97.71% | 98.22% | 96.26% | 94.98% | 91.40% |
| 21:00 | 94.45% | 92.56% | 91.45% | 93.99% | 95.48% | 97.43% | 99.73% | 99.14% | 97.59% | 95.87% | 93.75% | 93.53% |
| 22:00 | 94.62% | 93.15% | 94.17% | 92.70% | 96.00% | 98.74% | 99.42% | 99.59% | 98.44% | 97.31% | 94.60% | 93.15% |
| 23:00 | 94.95% | 92.59% | 94.31% | 93.37% | 95.97% | 98.50% | 99.73% | 100.00% | 98.58% | 96.81% | 94.95% | 92.14% |

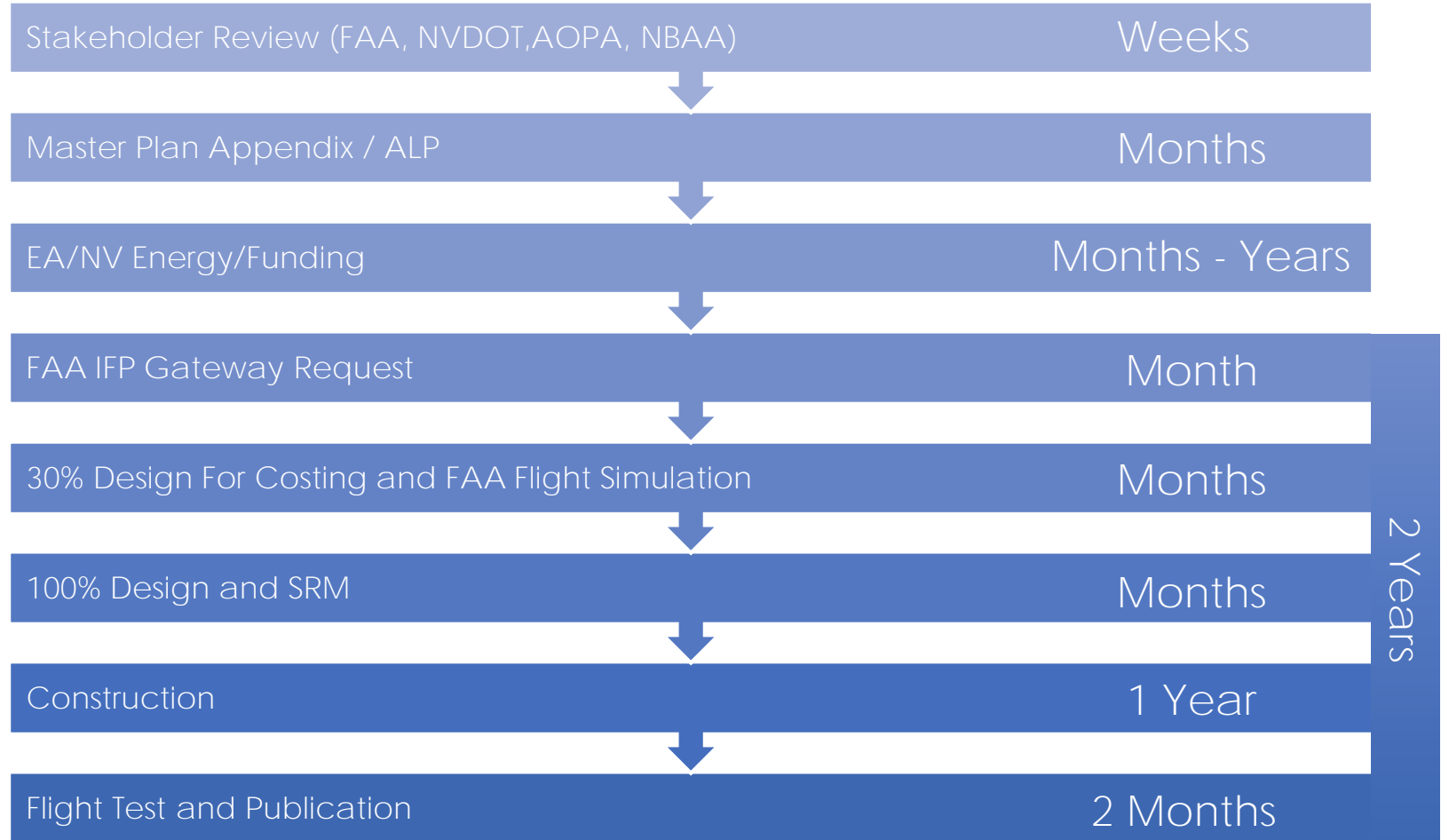
| | | | | | | | | | | | | |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Day | 80.84% | 81.90% | 81.13% | 83.83% | 90.24% | 92.69% | 96.73% | 96.48% | 89.35% | 82.36% | 79.86% | 79.67% |
| Night | 93.23% | 91.50% | 91.54% | 93.73% | 97.14% | 98.84% | 99.40% | 99.54% | 98.56% | 95.25% | 94.00% | 91.88% |
| 24 HR | 88.07% | 87.50% | 86.77% | 88.78% | 93.11% | 95.00% | 97.84% | 97.75% | 93.96% | 89.34% | 88.11% | 86.79% |

Benefits

- ✓ Increase overall airport operations from traffic that typically needs to land at night
- ✓ Enable aircraft to avoid operating during daytime high wind periods
- ✓ RLLS Solution provides additional level of vertical flight path protection due to placement along terrain



Implementation



Summary

1. Is there a solution?
 - Yes
2. What are the benefits?
 - Nighttime Operations
 - Improved Safety
3. How much will it cost and how long might it take?
 - \$3 - \$5M
 - 2 – 4 Years (Depending on Funding)
4. Will the FAA Approve Nighttime Ops?
 - To Be Determined



FlyCarsonCity.com



Questions?

Paul Hannah

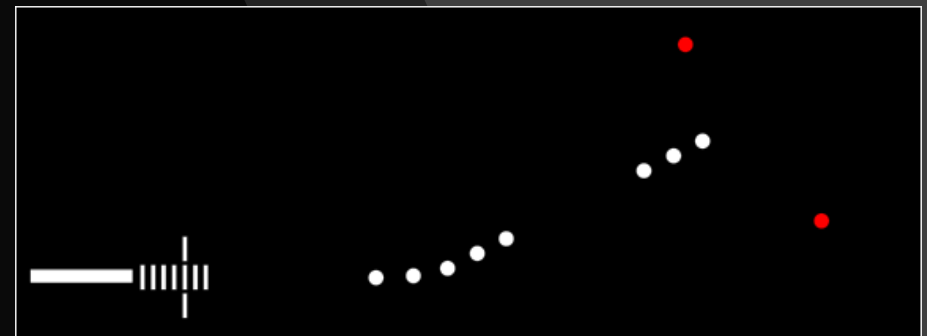
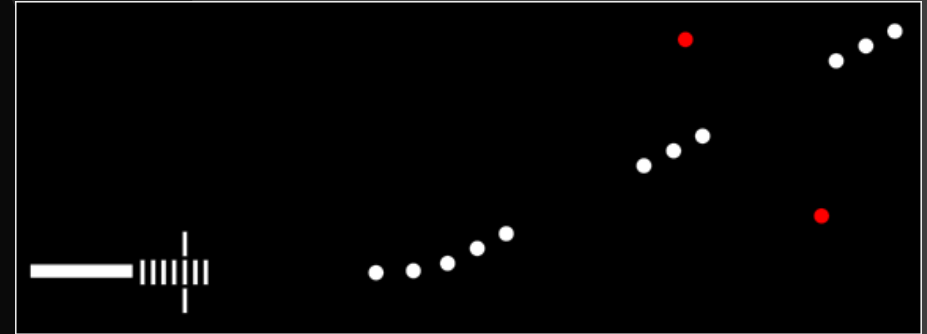
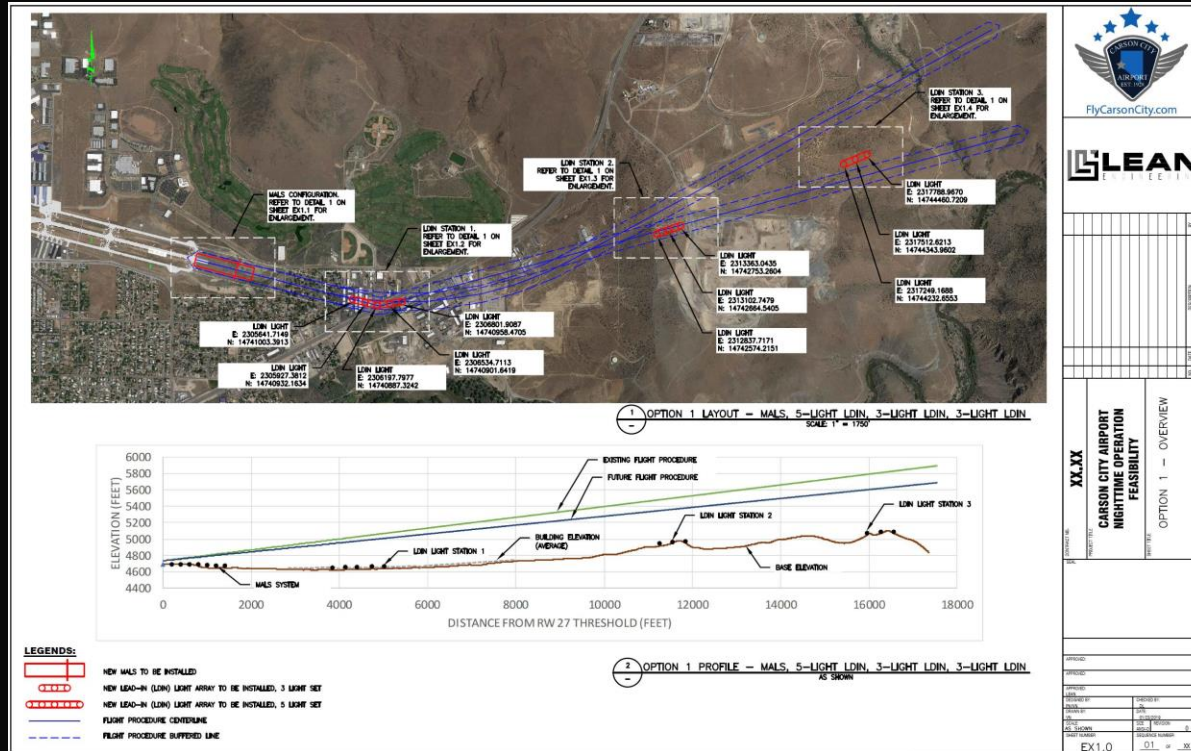
Chief Airspace and Flight Operations
Engineer

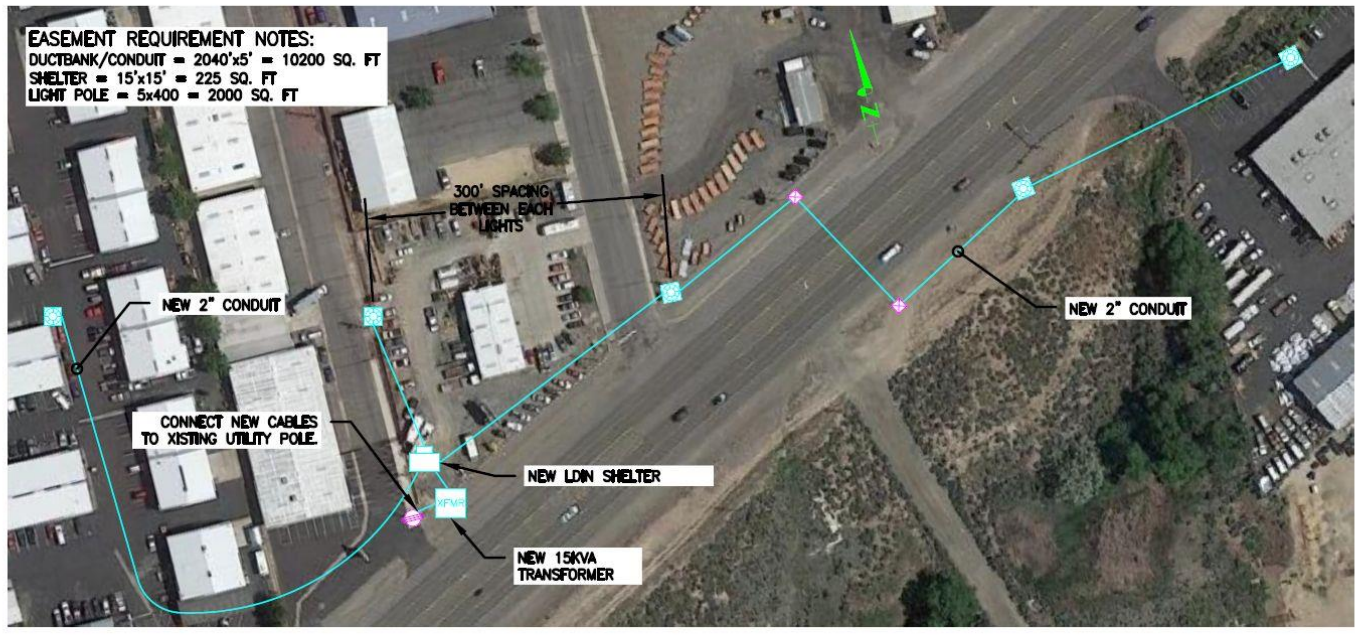
Lean Engineering

phannah@leancorp.com







Option A1: MALS, 5xLDIN, 3xLDIN, 3xLDIN

Option B1: MALS, 5xLDIN, 3xLDIN

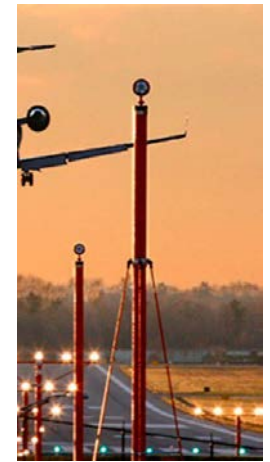
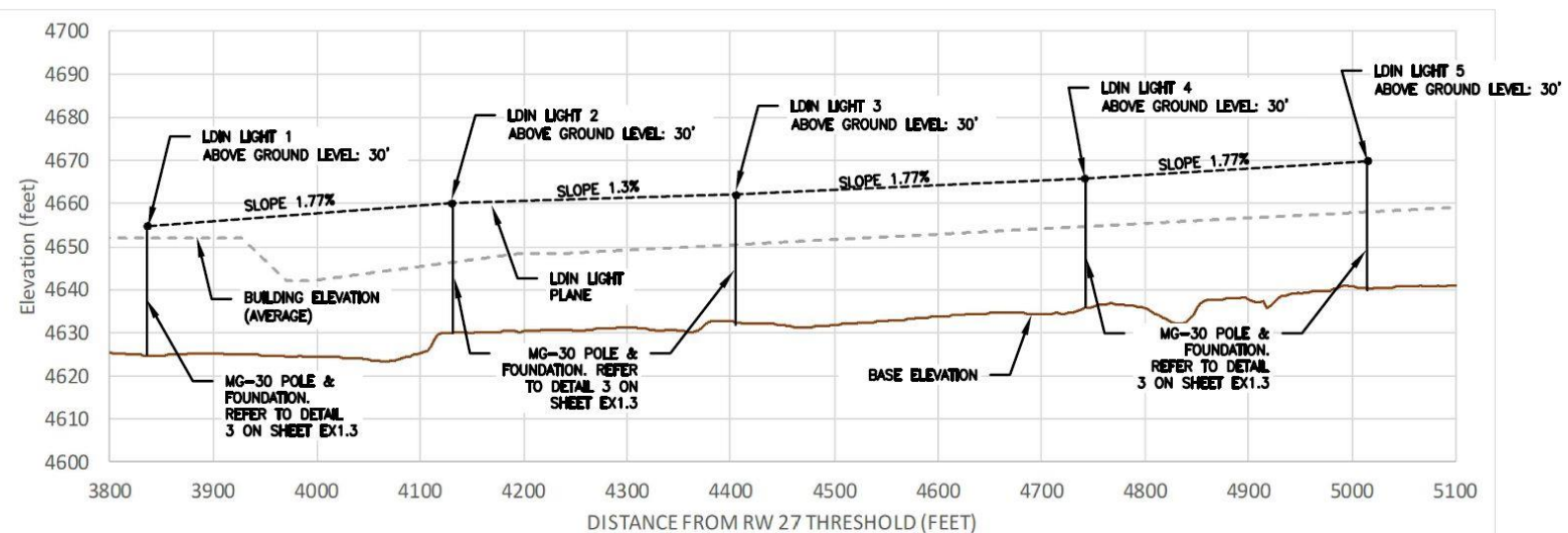




LEGENDS:

-  2" CONDUIT
-  2W-4C DUCTBANK
-  NEW MALS/MALSF 11-LIGHT BAR TO BE INSTALLED
-  NEW MALS/MALSF 5-LIGHT BAR TO BE INSTALLED
-  NEW MALSF FLASHING LIGHT TO BE INSTALLED
-  NEW LDIN LIGHT TO BE INSTALLED
-  NEW SHELTER
-  NEW TRANSFORMER
-  EXISTING UTILITY POLE
-  EXISTING HANDHOLE

LDIN STATION 1 ENLARGEMENT
 SCALE: 1" = 150'

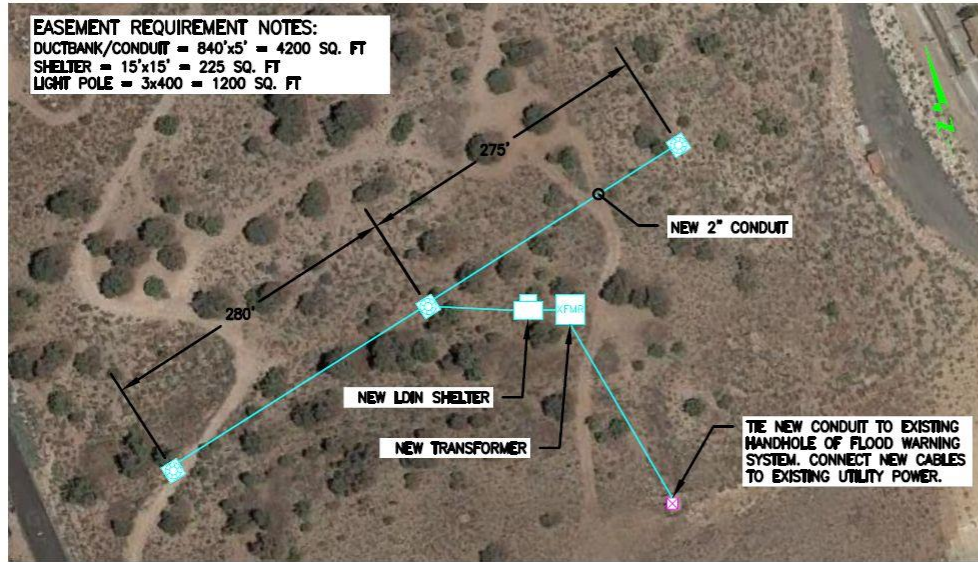


| NO. | DATE | DESCRIPTION | BY |
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CONTRACT NO. **XX.XX**

PROJECT TITLE **CARSON CITY AIRPORT NIGHTTIME OPERATION FEASIBILITY**

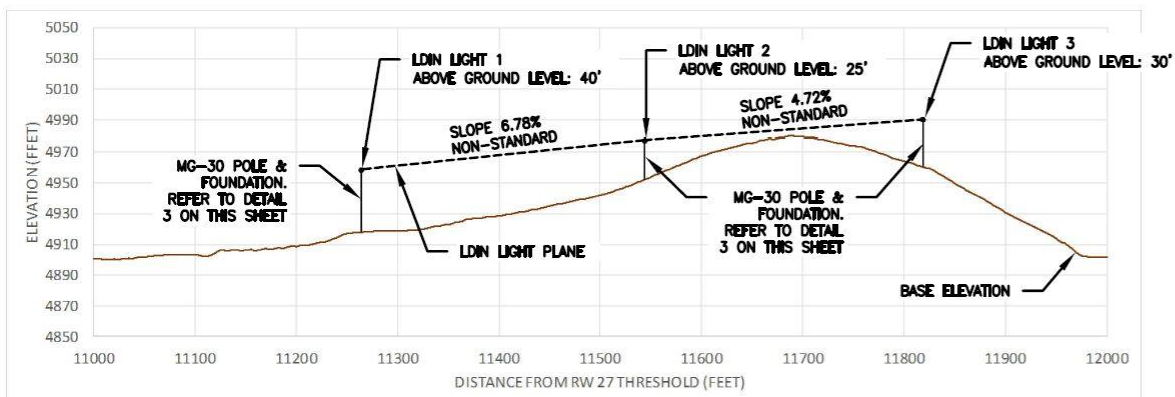
SHEET TITLE **OPTION 1 - LDIN STATION 1 ENLARGEMENT**



LEGENDS:

-  2" CONDUIT
-  2W-4"C DUCTBANK
-  NEW MALS/MALSF 11-LIGHT BAR TO BE INSTALLED
-  NEW MALS/MALSF 5-LIGHT BAR TO BE INSTALLED
-  NEW MALSF FLASHING LIGHT TO BE INSTALLED
-  NEW LDIN LIGHT TO BE INSTALLED
-  NEW SHELTER
-  NEW TRANSFORMER
-  EXISTING UTILITY POLE
-  EXISTING HANDHOLE

1
-
LDIN STATION 2 ENLARGEMENT
SCALE: 1" = 150'



3A MG-20 POLE
NTS



3B MG-30 POLE
NTS

3 MG-20 & MG-30 POLES
NTS

XX.XX

CARSON CITY AIRPORT
NIGHTTIME OPERATION
FEASIBILITY

OPTION 1 - LDIN
STATION 2
ENLARGEMENT

CONTRACT NO.

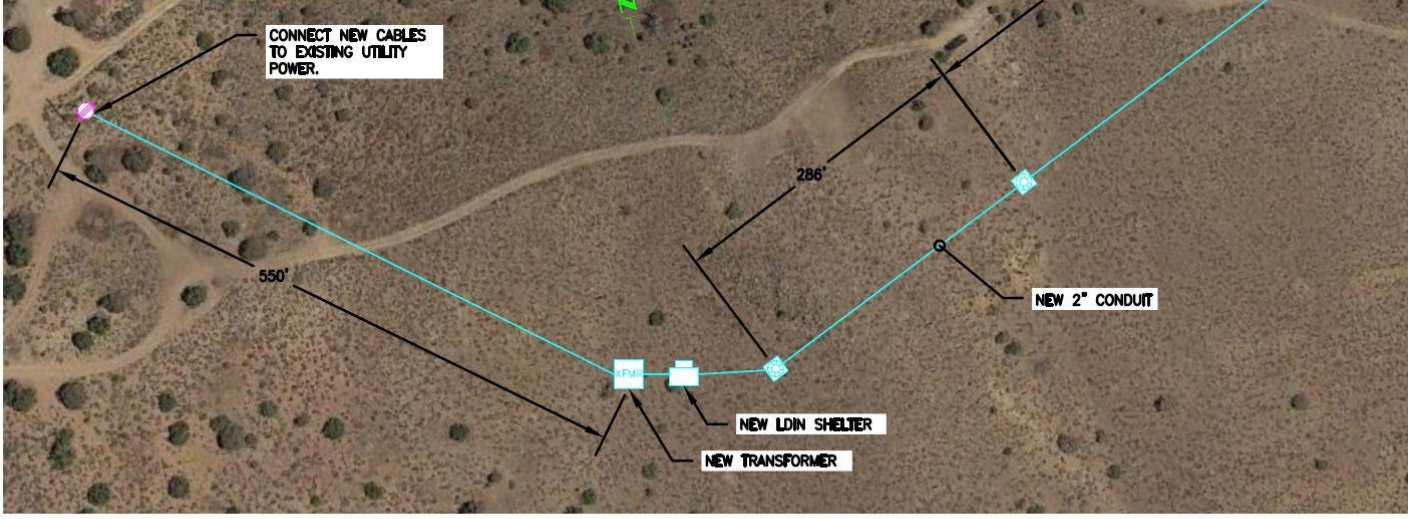
PROJECT TITLE

SHEET TITLE

SEAL

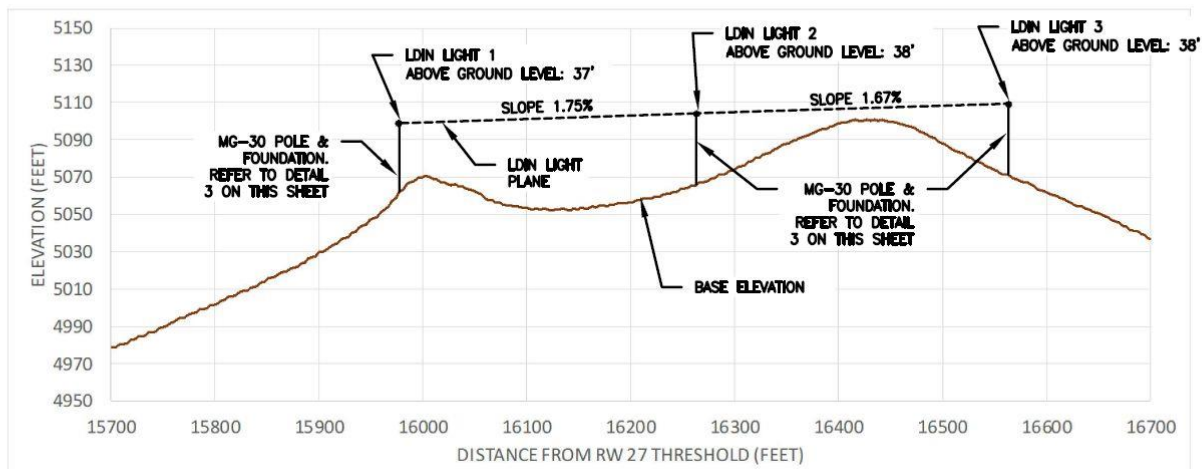
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EASEMENT REQUIREMENT NOTES:
 DUCTBANK/CONDUIT = 1440'x5' = 7200 SQ. FT
 SHELTER = 15'x15' = 225 SQ. FT
 LIGHT POLE = 3x400 = 1200 SQ. FT

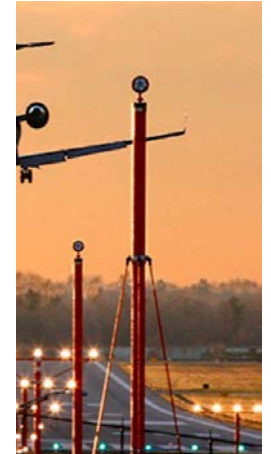


- LEGENDS:**
- 2" CONDUIT
 - 2W-4"C DUCTBANK
 - NEW MALS/MALSF 11-LIGHT BAR TO BE INSTALLED
 - NEW MALS/MALSF 5-LIGHT BAR TO BE INSTALLED
 - NEW MALSF FLASHING LIGHT TO BE INSTALLED
 - NEW LDIN LIGHT TO BE INSTALLED
 - NEW SHELTER
 - NEW TRANSFORMER
 - EXISTING UTILITY POLE
 - EXISTING HANDHOLE

LDIN STATION 3 ENLARGEMENT
 SCALE: 1" = 150'



3A MG-20 POLE
 NTS



3B MG-30 POLE
 NTS

3 MG-20 & MG-30 POLES

XX.XX

**CARSON CITY AIRPORT
 NIGHTTIME OPERATION
 FEASIBILITY**

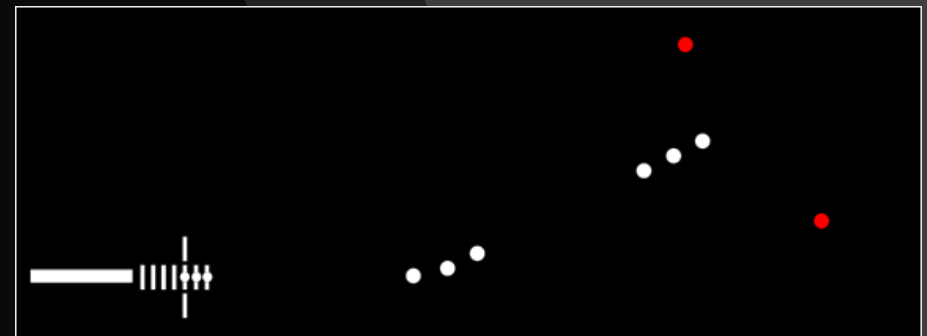
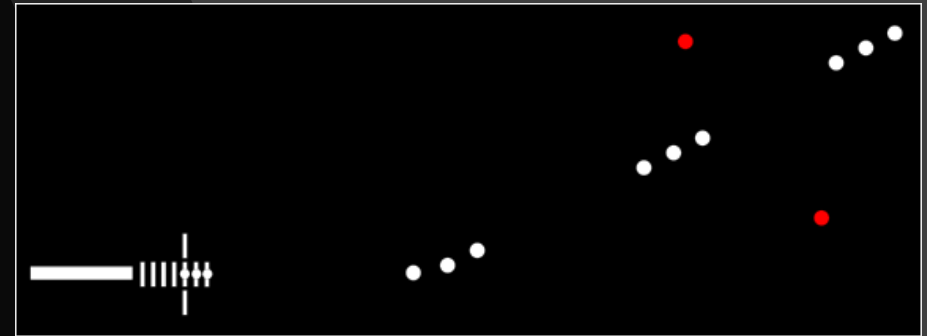
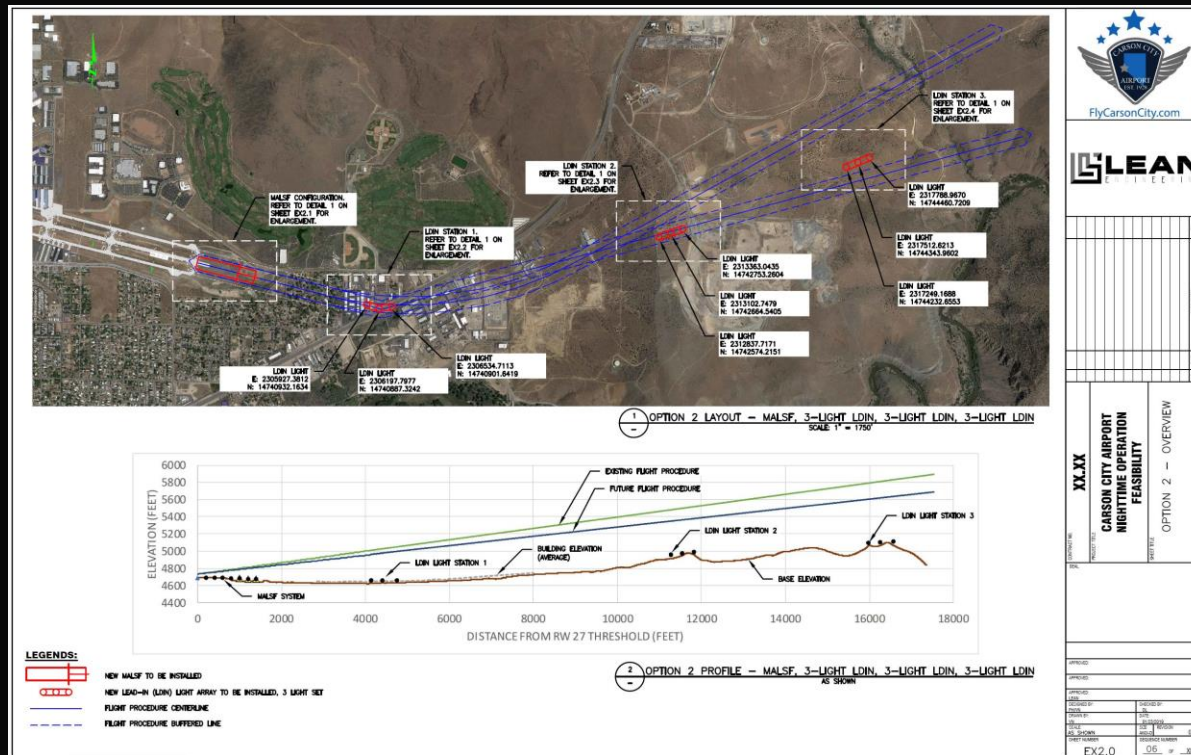
OPTION 1 - LDIN
 STATION 3
 ENLARGEMENT

CONTRACT NO.
 PROJECT TITLE
 SHEET TITLE

APPROVED:
 APPROVED:

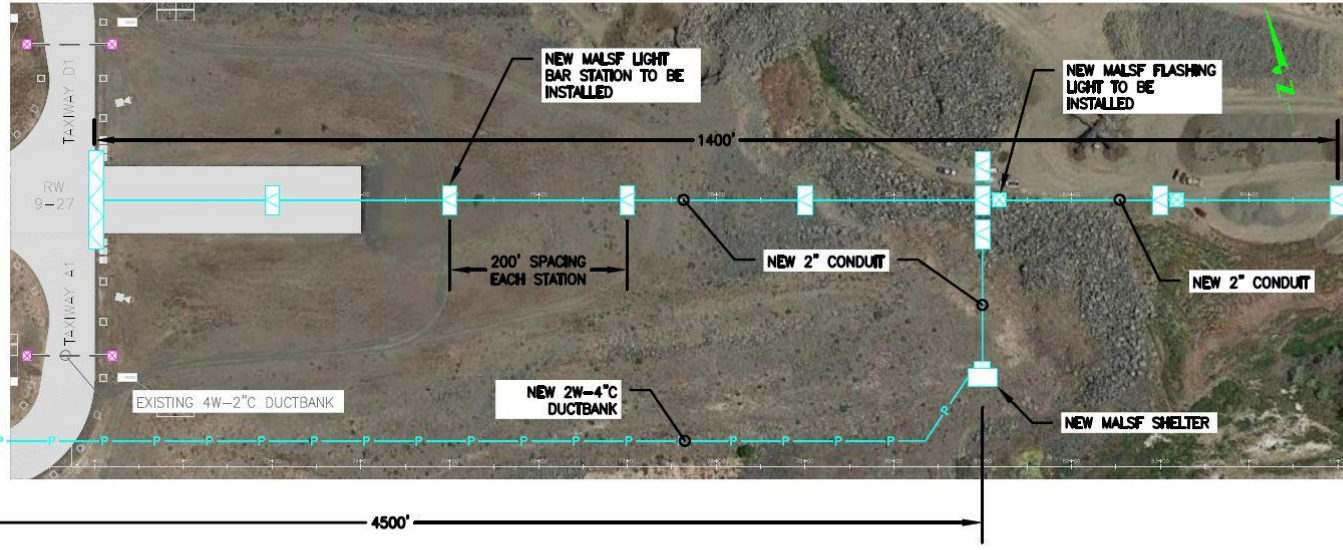
Option A2: MALSF, 3xLDIN, 3xLDIN, 3xLDIN

Option B2: MALSF, 3xLDIN, 3xLDIN





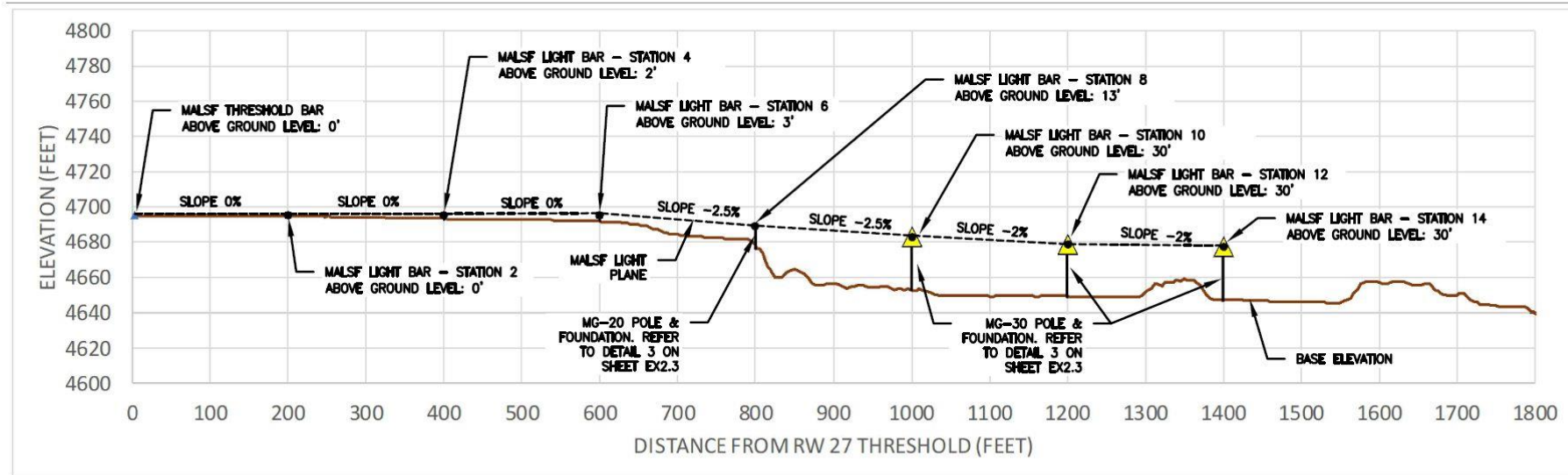
FlyCarsonCity.com



LEGENDS:

- 2" CONDUIT
- 2W-4°C DUCTBANK
- NEW MALS/MALSFL 11-LIGHT BAR TO BE INSTALLED
- NEW MALS/MALSFL 5-LIGHT BAR TO BE INSTALLED
- NEW MALSFL FLASHING LIGHT TO BE INSTALLED
- NEW LDIN LIGHT TO BE INSTALLED
- NEW SHELTER
- NEW TRANSFORMER
- EXISTING UTILITY POLE
- EXISTING HANDHOLE

MALS ENLARGEMENT
SCALE: 1" = 180'



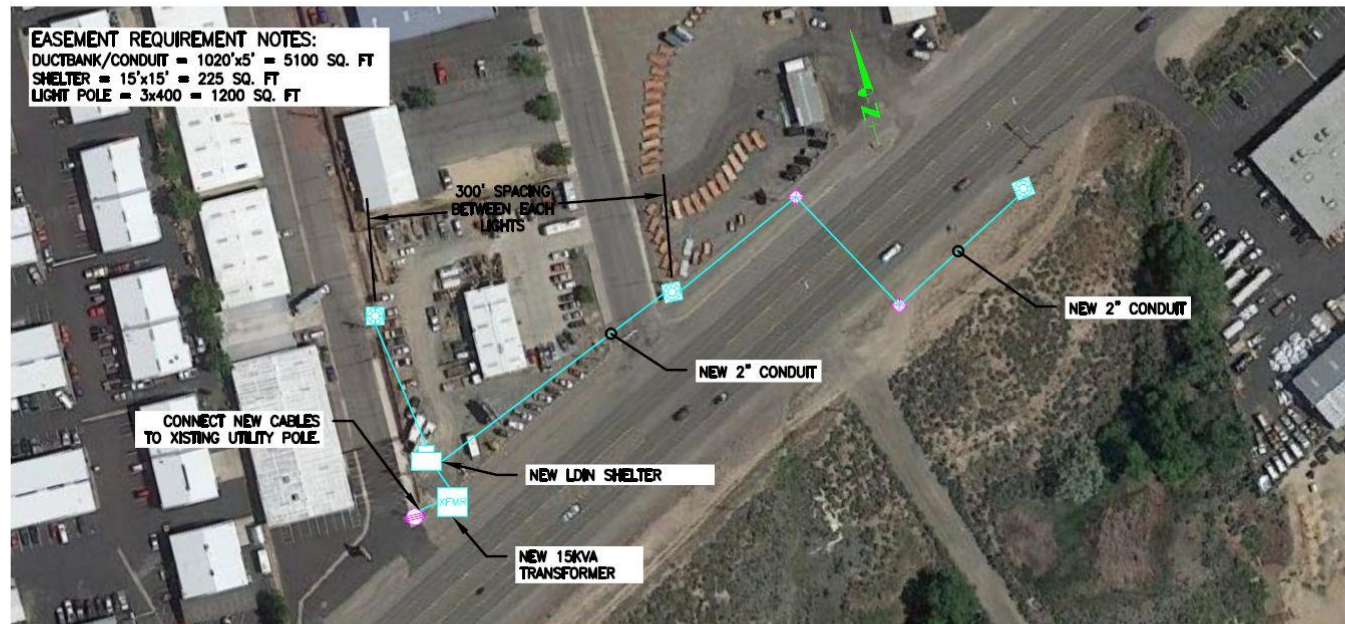
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| XX.XX | CONTRACT NO. | PROJECT TITLE CARSON CITY AIRPORT NIGHTTIME OPERATION FEASIBILITY | SHEET TITLE OPTION 2 - MALS ENLARGEMENT |
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| SEAL |
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| APPROVED: |
| APPROVED: |

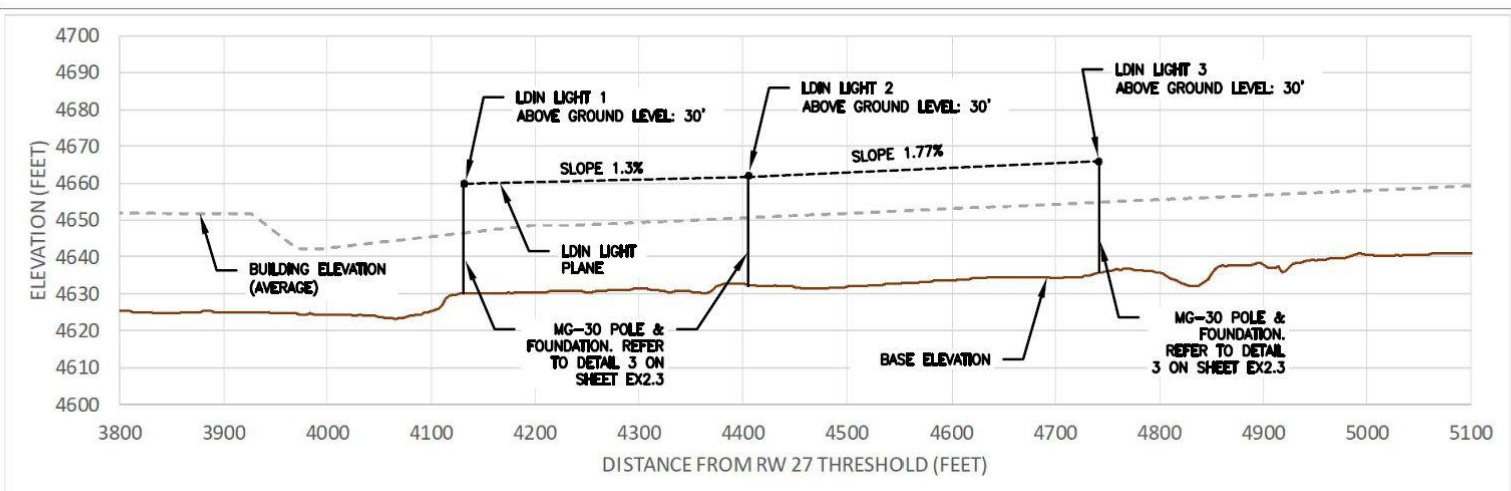
EASEMENT REQUIREMENT NOTES:
 DUCTBANK/CONDUIT = 1020'x5' = 5100 SQ. FT
 SHELTER = 15'x15' = 225 SQ. FT
 LIGHT POLE = 3x400 = 1200 SQ. FT



LEGENDS:

- 2" CONDUIT
- 2W-4" C DUCTBANK
- NEW MALS/MALSF 11-LIGHT BAR TO BE INSTALLED
- NEW MALS/MALSF 5-LIGHT BAR TO BE INSTALLED
- NEW MALSF FLASHING LIGHT TO BE INSTALLED
- NEW LDIN LIGHT TO BE INSTALLED
- NEW SHELTER
- NEW TRANSFORMER
- EXISTING UTILITY POLE
- EXISTING HANDHOLE

① LDIN STATION 1 ENLARGEMENT
 SCALE: 1" = 150'



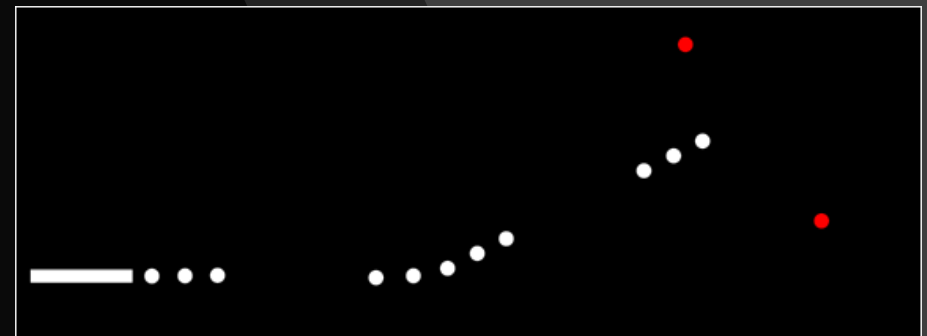
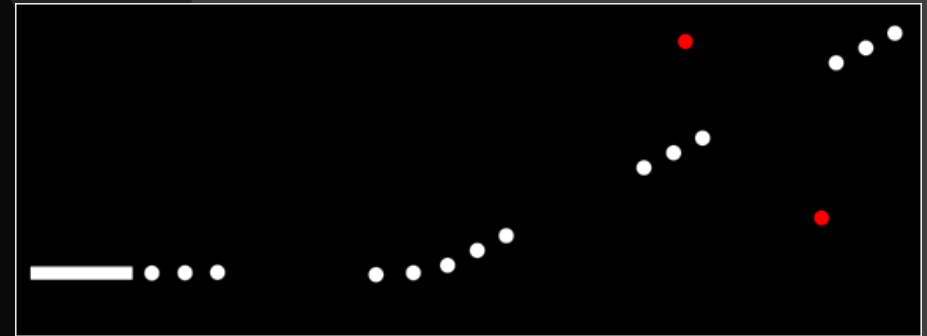
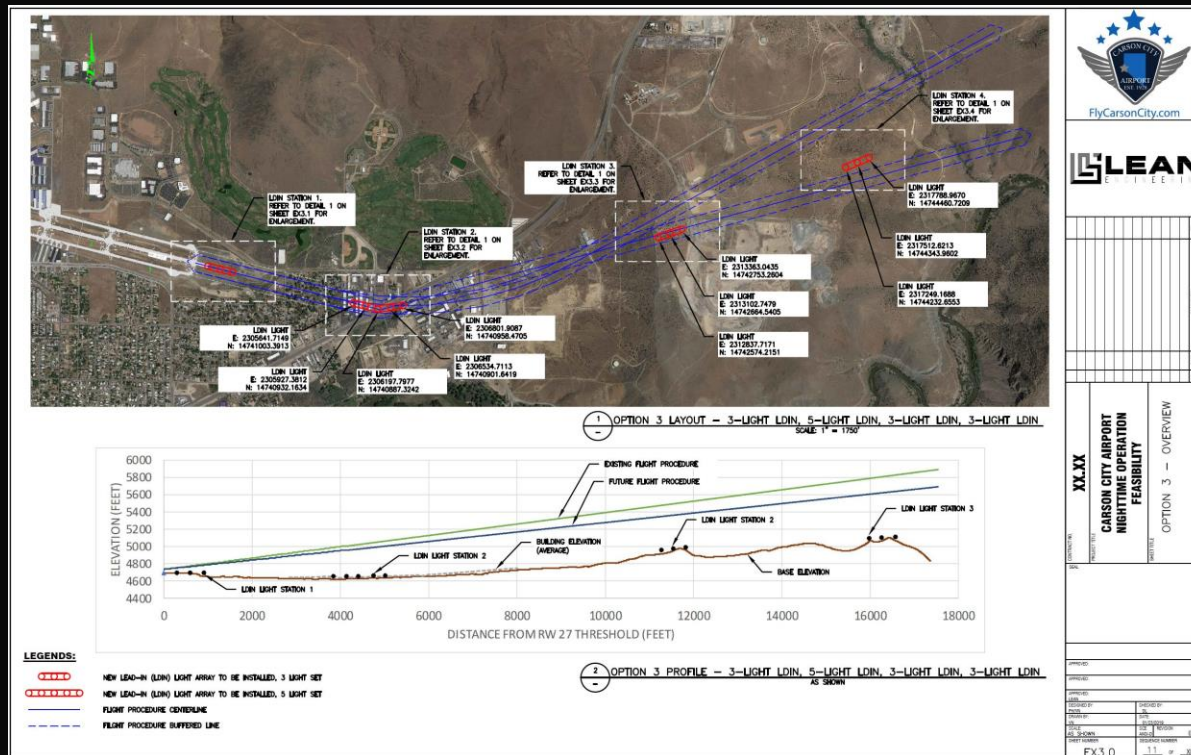
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CARSON CITY AIRPORT NIGHTTIME OPERATION FEASIBILITY
 OPTION 2 - LDIN STATION 1 ENLARGEMENT

CONTRACT NO. _____
 PROJECT TITLE _____
 SHEET TITLE _____
 SEAL _____
 APPROVED _____
 APPROVED _____

Option A3: 3xLDIN, 5xLDIN, 3xLDIN, 3xLDIN

Option B3: 3xLDIN, 5xLDIN, 3xLDIN

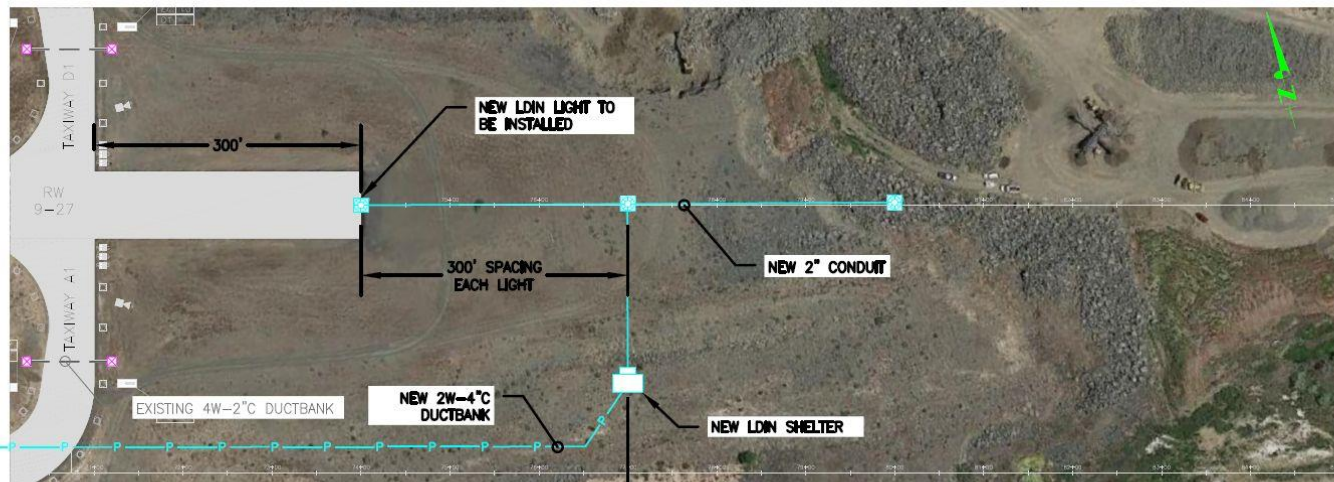




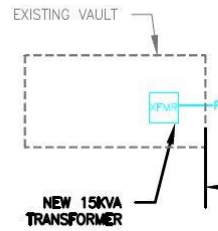
FlyCarsonCity.com



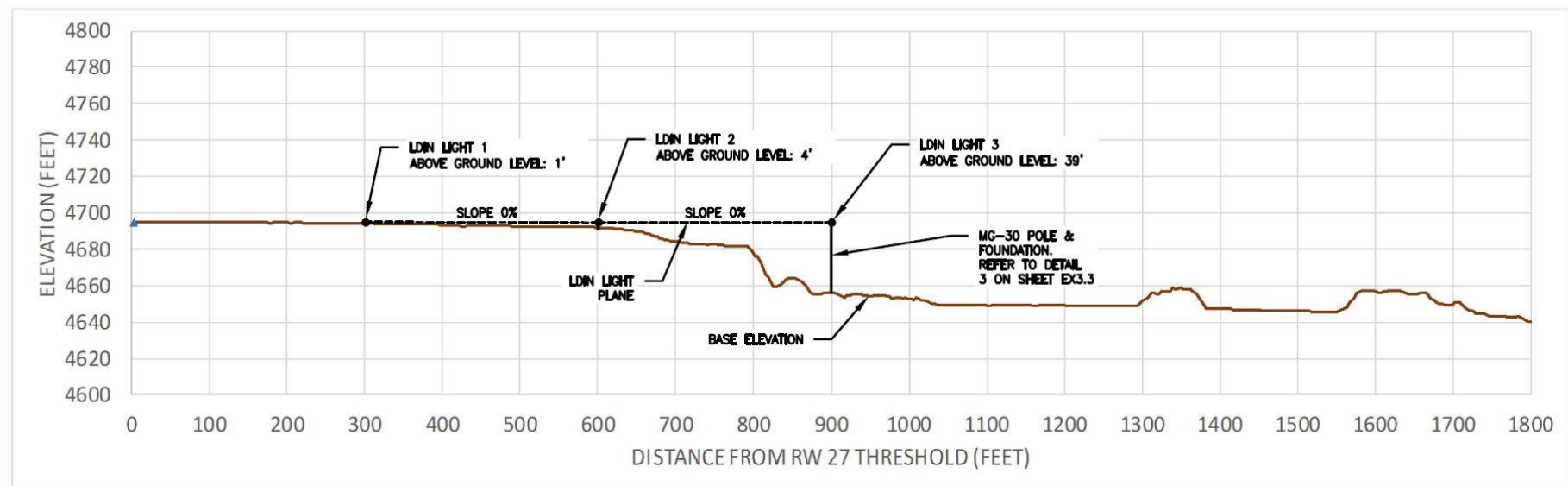
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- LEGENDS:**
- 2" CONDUIT
 - 2W-4°C DUCTBANK
 - NEW MALS/MALSF 11-LIGHT BAR TO BE INSTALLED
 - NEW MALS/MALSF 5-LIGHT BAR TO BE INSTALLED
 - NEW MALSF FLASHING LIGHT TO BE INSTALLED
 - NEW LDIN LIGHT TO BE INSTALLED
 - NEW SHELTER
 - NEW TRANSFORMER
 - EXISTING UTILITY POLE
 - EXISTING HANDHOLE



1 LDIN STATION 1 ENLARGEMENT
SCALE: 1" = 180'



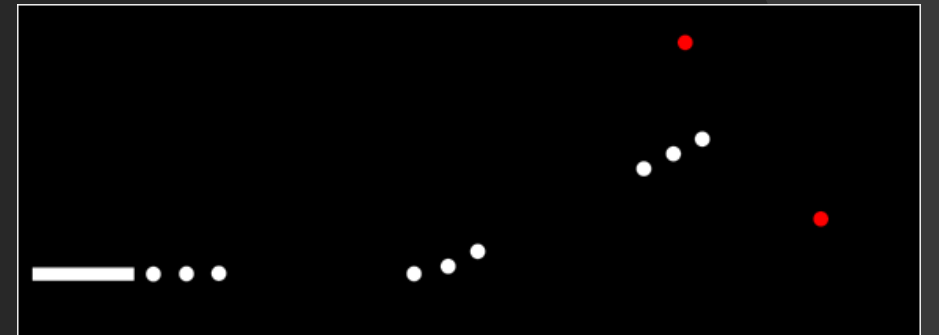
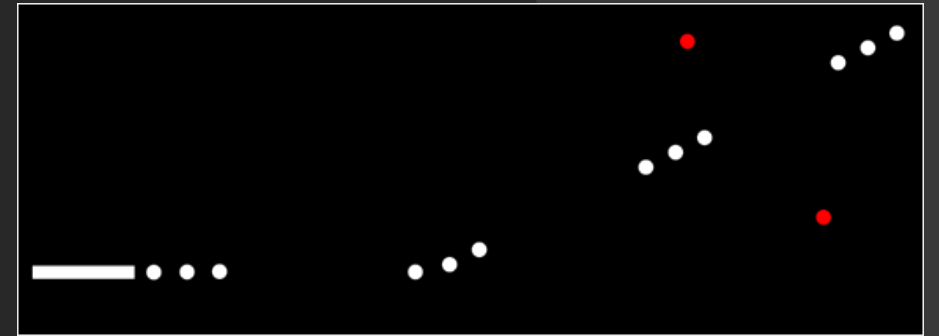
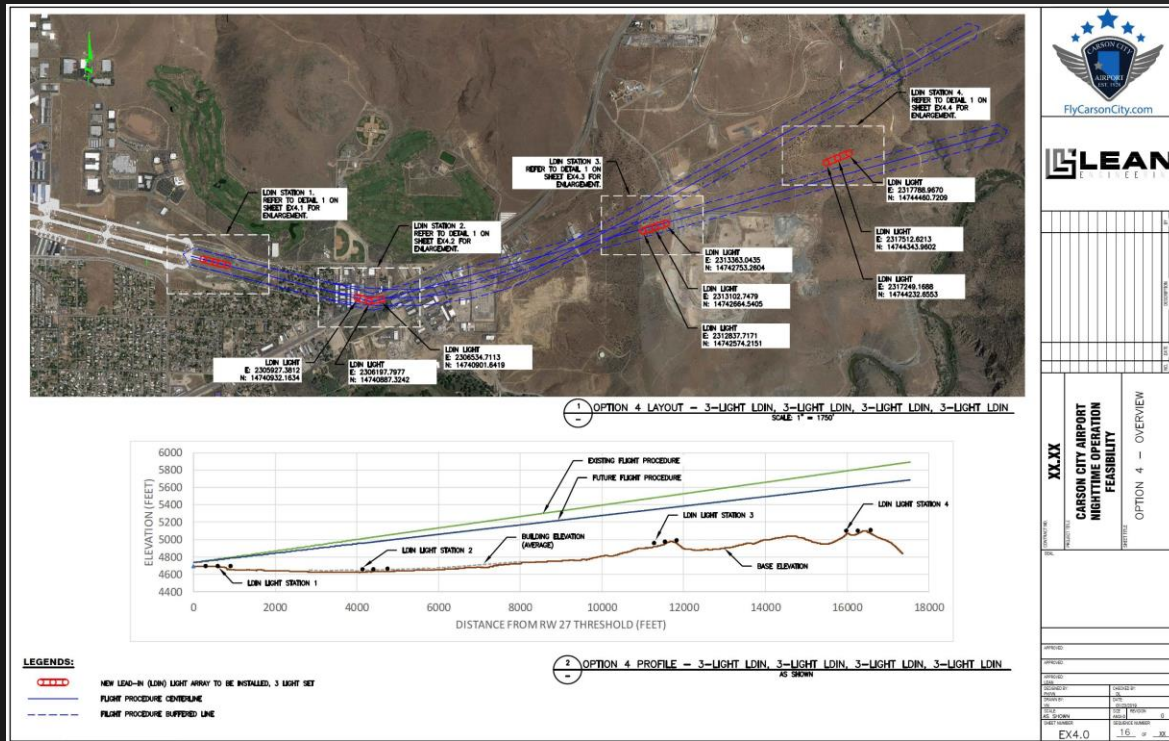
2 LDIN STATION 1 PROFILE

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| XX.XX | CARSON CITY AIRPORT NIGHTTIME OPERATION FEASIBILITY | OPTION 3 - LDIN STATION 1 ENLARGEMENT |
| <small>CONTRACT NO.</small> | <small>PROJECT TITLE</small> | <small>SHEET TITLE</small> |

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| SEAL | APPROVED: |
| | APPROVED: |

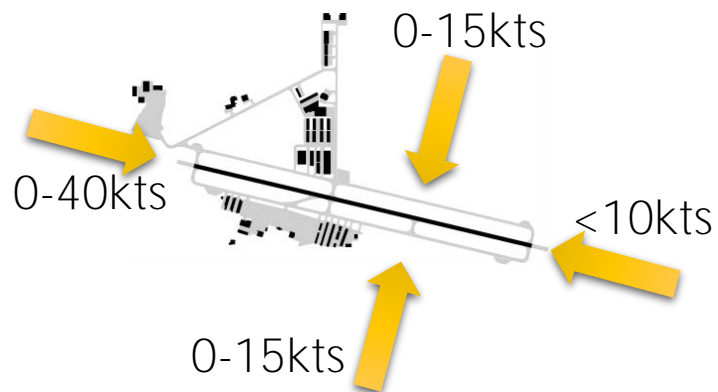
Option A4: 3xLDIN, 3xLDIN, 3xLDIN, 3xLDIN

Option B4: 3xLDIN, 3xLDIN, 3xLDIN



Likelihood That Aircraft Will Land

CAT D - 1800ft – 3 Miles



RWY 27 RNAV GPS-A Overall Efficiency

| | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|-------|--------|--------|--------|--------|--------|--------|---------|---------|--------|--------|--------|--------|
| 0:00 | 90.70% | 91.78% | 92.70% | 94.65% | 97.71% | 99.30% | 99.46% | 99.69% | 99.43% | 96.57% | 95.49% | 91.08% |
| 1:00 | 90.43% | 92.32% | 92.04% | 94.79% | 96.89% | 98.46% | 99.60% | 100.00% | 99.58% | 96.68% | 94.70% | 90.60% |
| 2:00 | 90.68% | 90.68% | 92.35% | 94.95% | 97.84% | 99.27% | 99.86% | 99.73% | 99.01% | 97.28% | 94.49% | 89.89% |
| 3:00 | 90.16% | 89.58% | 92.53% | 94.33% | 97.18% | 98.71% | 99.90% | 98.48% | 99.30% | 96.70% | 93.26% | 89.38% |
| 4:00 | 89.03% | 91.71% | 91.27% | 94.02% | 97.70% | 99.13% | 100.00% | 98.79% | 99.44% | 94.58% | 94.09% | 88.80% |
| 5:00 | 89.15% | 92.01% | 89.62% | 95.30% | 97.94% | 99.16% | 100.00% | 98.76% | 99.72% | 95.84% | 92.60% | 88.50% |
| 6:00 | 89.22% | 92.20% | 91.91% | 95.59% | 97.85% | 99.30% | 100.00% | 97.79% | 99.16% | 96.80% | 91.77% | 88.88% |
| 7:00 | 87.76% | 91.54% | 90.74% | 95.19% | 96.46% | 98.23% | 99.73% | 96.14% | 99.16% | 96.05% | 91.87% | 87.11% |
| 8:00 | 87.04% | 90.28% | 89.86% | 92.61% | 95.74% | 95.99% | 99.08% | 95.22% | 98.70% | 94.40% | 90.95% | 85.50% |
| 9:00 | 87.50% | 88.48% | 85.68% | 86.53% | 93.35% | 93.29% | 99.32% | 94.21% | 97.35% | 92.79% | 89.86% | 82.32% |
| 10:00 | 83.77% | 86.51% | 83.17% | 88.72% | 90.34% | 89.90% | 99.32% | 95.61% | 95.63% | 90.86% | 88.04% | 79.95% |
| 11:00 | 81.66% | 84.19% | 81.22% | 83.70% | 87.15% | 90.70% | 98.23% | 96.79% | 94.45% | 88.63% | 83.25% | 80.73% |
| 12:00 | 77.91% | 74.92% | 80.33% | 80.89% | 87.16% | 90.65% | 96.88% | 95.19% | 91.14% | 81.65% | 72.37% | 75.15% |
| 13:00 | 72.04% | 75.97% | 76.77% | 77.04% | 85.19% | 91.45% | 95.64% | 94.68% | 81.67% | 74.48% | 64.33% | 71.06% |
| 14:00 | 65.37% | 71.64% | 72.23% | 79.05% | 83.12% | 86.98% | 94.20% | 95.01% | 80.59% | 74.10% | 61.41% | 67.74% |
| 15:00 | 63.12% | 72.58% | 71.26% | 78.26% | 86.35% | 88.79% | 93.10% | 93.64% | 81.73% | 65.83% | 68.42% | 64.84% |
| 16:00 | 71.39% | 73.39% | 74.16% | 78.57% | 85.68% | 89.66% | 92.36% | 92.58% | 80.39% | 67.39% | 78.37% | 79.80% |
| 17:00 | 86.86% | 82.47% | 77.34% | 78.02% | 84.06% | 91.64% | 92.92% | 94.84% | 80.89% | 71.65% | 88.65% | 89.50% |
| 18:00 | 91.98% | 86.81% | 82.16% | 82.78% | 87.30% | 92.24% | 95.01% | 95.88% | 86.27% | 83.21% | 91.94% | 91.40% |
| 19:00 | 92.85% | 89.23% | 88.41% | 86.69% | 93.12% | 94.37% | 97.03% | 96.93% | 93.27% | 91.72% | 93.85% | 91.74% |
| 20:00 | 91.77% | 92.10% | 90.71% | 90.38% | 94.37% | 95.90% | 96.34% | 97.71% | 98.22% | 95.70% | 94.53% | 90.54% |
| 21:00 | 91.59% | 91.95% | 91.05% | 93.51% | 95.48% | 97.43% | 99.73% | 99.14% | 97.59% | 95.04% | 93.23% | 92.63% |
| 22:00 | 92.04% | 92.07% | 93.49% | 92.55% | 95.87% | 98.74% | 99.42% | 99.59% | 98.44% | 96.62% | 93.86% | 91.75% |
| 23:00 | 92.46% | 91.51% | 94.04% | 92.98% | 95.43% | 98.08% | 99.73% | 100.00% | 98.58% | 96.53% | 93.84% | 91.28% |

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|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Day | 77.76% | 80.95% | 80.25% | 83.45% | 89.49% | 92.61% | 96.63% | 95.32% | 89.00% | 81.62% | 78.88% | 77.42% |
| Night | 90.64% | 90.46% | 90.94% | 93.31% | 96.64% | 98.70% | 99.40% | 99.19% | 98.48% | 94.87% | 93.31% | 90.43% |
| 24 HR | 85.27% | 86.50% | 86.04% | 88.38% | 92.47% | 94.89% | 97.79% | 96.93% | 93.74% | 88.80% | 87.30% | 85.01% |