visual communication technologies for airports

AIM SYSTEMS

Jeff Campbell & Associates Inc.

communications ▪ engineering ▪ consulting

Jeff Campbell and Associates

- *Company based in Mississauga, Ontario, Canada*
- *Industry leader in network visual communication systems*
- *Multi-disciplined organization offering a broad range of professional services*
- *Our team of engineers, programmers, designers, project managers and support staff is equipped to provide customers with the highest standard of service and products*
- *Our Corporate Philosophy: Ensure Customer Satisfaction*

Presentation Outline

- *Background*
- *JCAI and AIM Systems*
- *Current Installations*
- *Other Airport Solutions*
- *Bay Manager System*
- *Future Applications*
- *Summary*

Background

Background

- *Number of recent accidents/incidents have occurred involving contact between deicing vehicles and aircraft in engines-on deicing operations*
- *General understanding that the standards, regulations and industry guidance related to communication protocols for engines-on deicing operations were deficient*

SAE Guidance

- *In 2010, the SAE G-12 Facilities Subcommittee recommended changes to SAE ARP 5660, Deicing Facility Operational Procedures*
- *Changes to SAE ARP 5660 focused largely on the requirement for visual and verbal communication during engines-on deicing operations*
- *SAE ARP 5660 Revision A was approved by the SAE G-12 Facilities Subcommittee and SAE Aerospace Council, and was published in January 2011*
- *SAE ARP 4737, Aircraft Deicing/Anti-Icing Methods, will also be modified to include wording on the need for visual communication during engines-on deicing in the next revision of the document*
- *Other industry guidance and standards will be modified to include similar wording in upcoming months and years*

SAE ARP 5660A Wording

- *RATIONALE*
  ARP5660 has been revised to include updated procedures, most notably related to the requirement for visual hold procedures to supplement verbal communication procedures during aircraft “engines-on” deicing/anti-icing on the ground.

- *4.1.4 Visual Communication*
  Markings and visual message board displays should be consistent with SAE standard AS5635. Where illuminated guidance is provided, e.g. for pad lead-in, the applicable lights should be on. During “Engines On” deicing/anti-icing operation both verbal and visual communications are required to hold aircraft until all equipment and personnel are clear.

SAE ARP 5660A Wording

- *4.2.5.1 Deicing/anti-icing Information*
  After the deicing/anti-icing process is completed, and it has been verified that all deicing equipment are clear of the aircraft the Deicing Coordinator or the Primary Deicing Vehicle or the Deicing Operator/Crew shall verbally communicate with the PIC.
  f. During Engines on deicing/anti-icing operations both verbal and visual communication are required to hold aircraft until all equipment is clear.

- *4.2.5.2 All Clear Signal to Flight Crew During "Engines On" Deicing Operations*
  The operational plan shall include a process for the communication of an "all clear" signal to the flight crew. This signal shall be both verbal and visual and is performed after the following has been accomplished:
  a. De/anti-icing information has been provided to the flight crew
  b. It has been verified that deicing vehicles, equipment, and personnel are clear of the aircraft and in safety zones
  c. Ground crew has ensured safe taxi clearances

Primary Methods to Achieve Visual Hold

Deficiencies of Current Approaches

- *Congested work environment due to presence of equipment and personnel*
- *Increase in safety risk by having personnel and equipment in proximity to the aircraft in an engines-on environment*
- *Expensive: Labor, Operating Costs*
- *Increased verbal communications to the flight deck*
- *Lack of platform flexibility and expandability*

VMBs – The Optimized Solution

JCAI and AIM Systems

JCAI and AIM Systems

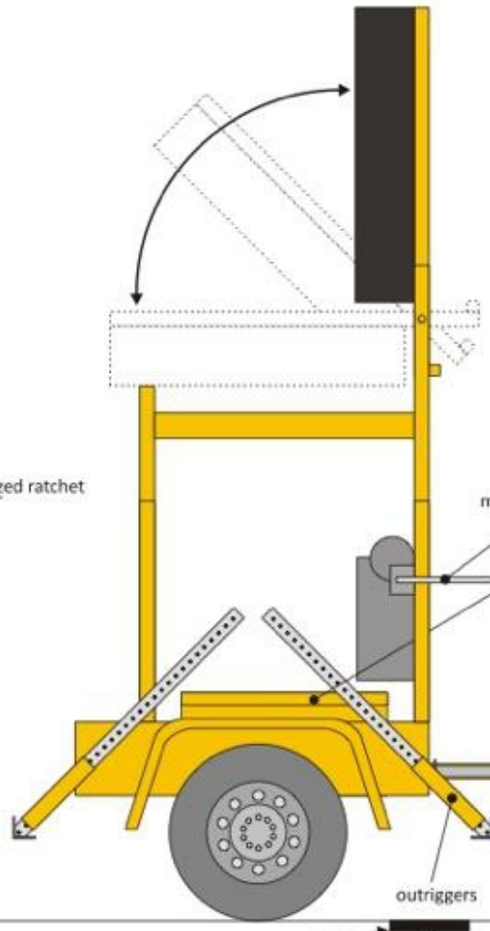
- *Product Offering:*
  - *Electronic variable message boards*
  - *Information display systems*
  - *Electronic wayfinding*
  - *Full color indoor LED screens*
  - *User friendly soft ware program interface*
- *Service Offering:*
  - *Operational analysis*
  - *Conceptual/functional design*
  - *Software interface/development*
  - *Technical Support*
  - *Project management*
  - *Systems integration and commissioning*

AIM Systems

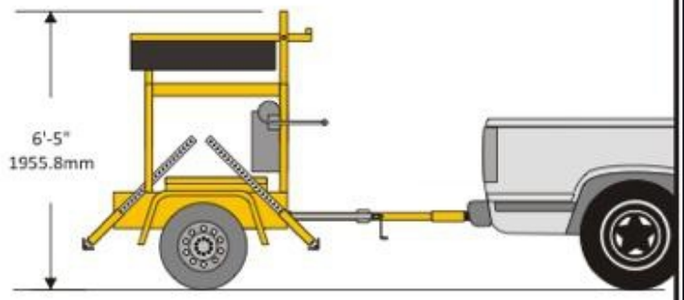
- *Airfield Intelligent Management (AIM) Systems*
- *Visual communication technology for airfields*
- *Designed for controlling precision movements for aircraft safety*
- *Clear visual communications increase airfield capacity and airline efficiency*
- *Standardized, easy-to-read, critical information delivery*
- *Visual message clarity alleviates pilot stress*


STOP
EGF4513
35

DESIGN OPTION 1:
Moveable LED Directional Signage:
Sign can be towed to site and un-hitched - outriggers are lowered to steady the trailer - bolts through the outrigger feet can add further stability
Sign board folds down for transport and can be manually or mechanically raised into place

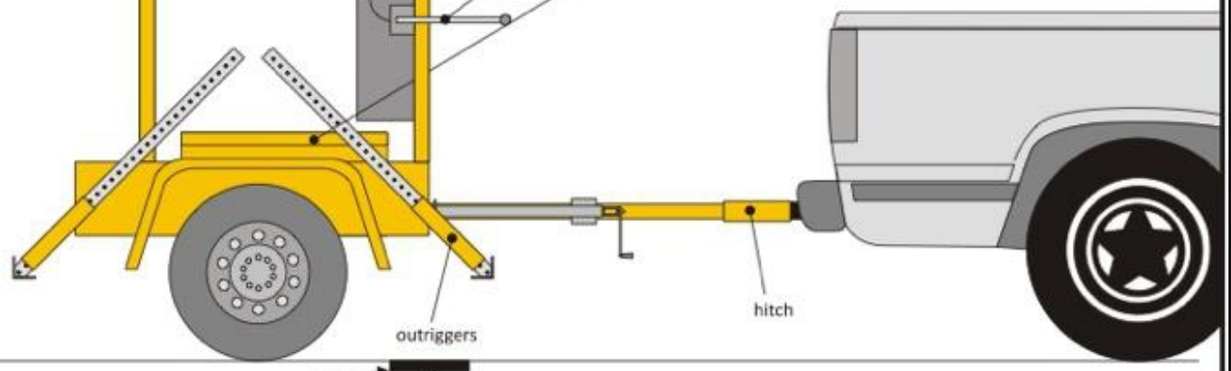


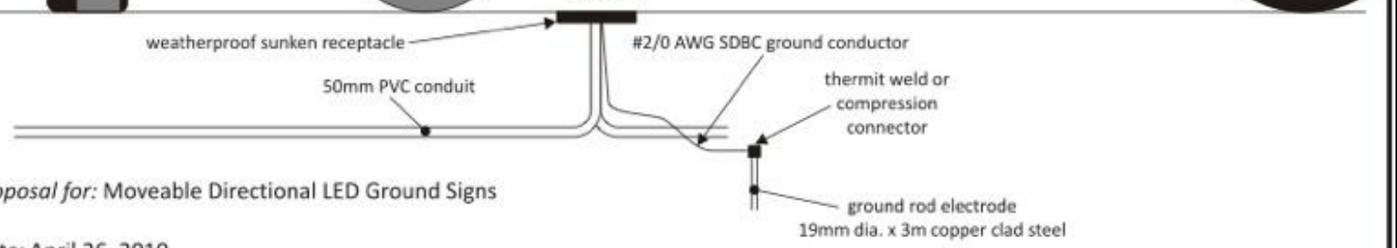
Trailer can further retract for ease of transport



- Each display has a 120V feed to a programmable module which displays the needed message
- Message changes can be made at the sign or through optional wireless modem
- Traffic lights controlled by 120V PLCs
- Can be battery powered or plugged into a weather proof sunken receptacle

Contains step down transformer,
Main disconnect, Power distribution panel,
Shut down relay, Duplex receptacles,
24VDC power supply, Network switch,
Thermostats.





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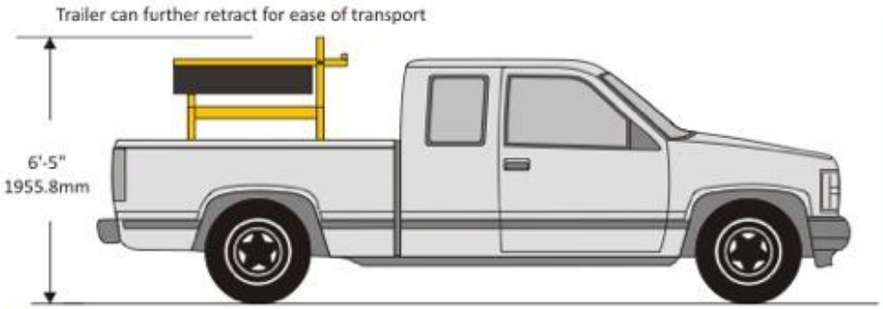
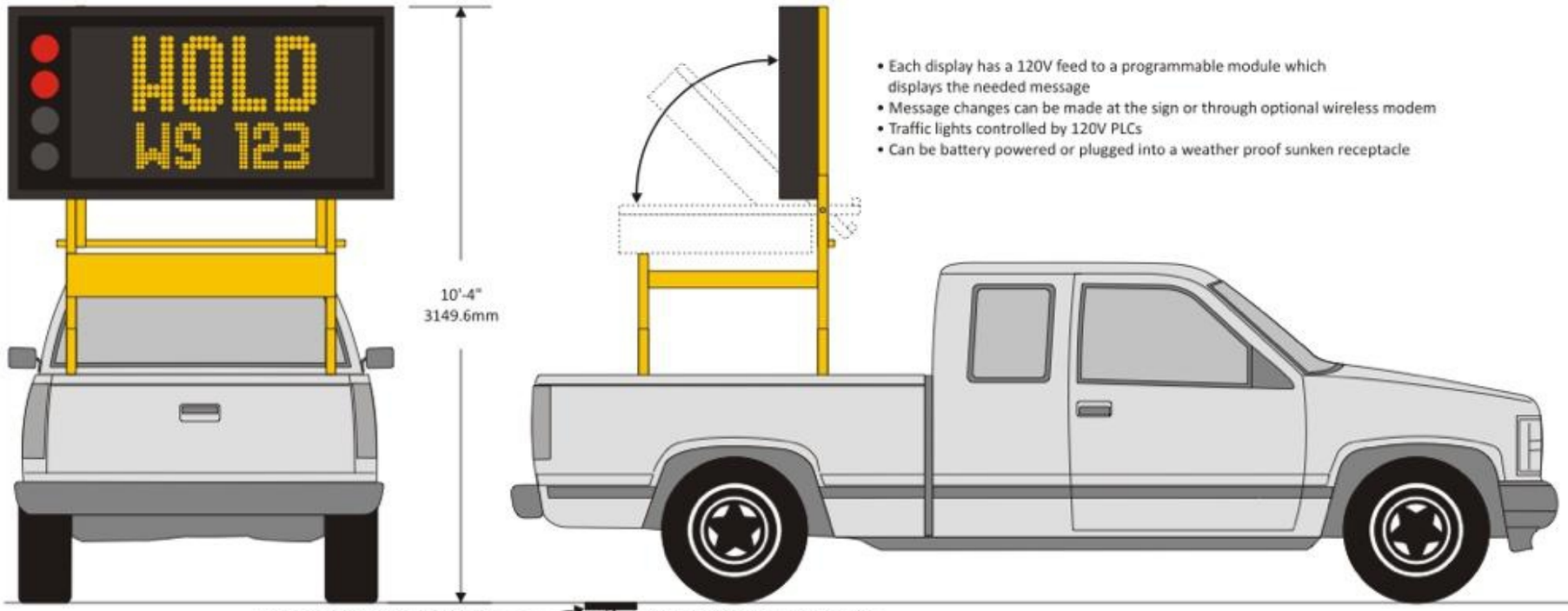
Proposal for: Moveable Directional LED Ground Signs

Date: April 26, 2010

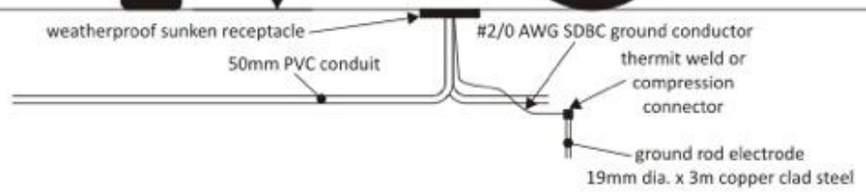
Scale: 1/2" = 1'

DESIGN OPTION 3:
Pick-up Truck Mounted LED Directional Signage:
Sign can be driven to site and parked temporarily
Sign board folds down for transport and can be manually or mechanically raised into place





- Each display has a 120V feed to a programmable module which displays the needed message
- Message changes can be made at the sign or through optional wireless modem
- Traffic lights controlled by 120V PLCs
- Can be battery powered or plugged into a weather proof sunken receptacle



Contains step down transformer,
Main disconnect, Power distribution panel,
Shut down relay, Duplex receptacles,
24VDC power supply, Network switch,
Thermostats.

Jeff Campbell & Associates Inc.

Proposal for: Moveable Directional LED Ground Signs

Date: April 26, 2010

Scale: 3/8" = 1'

Proposed Moveable LED Directional Deicing Signage

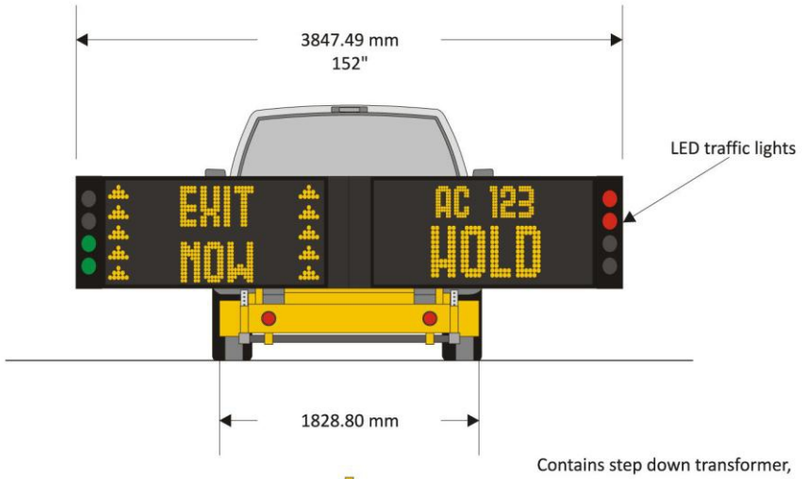
Jeff Campbell & Associates Inc.
COMMUNICATIONS · ENGINEERING · CONSULTING

Proposal for: Moveable LED Deicing Signage
Date: August 17, 2010
Prepared By: Jeff Campbell & Associates Inc.
P. 519-220-9840
e. jpcampbelldesign@gmail.com

Patent#: 61/379,584

AIM SYSTEMS

Proposed Moveable LED Directional Deicing Signage - Cabinet with Internally Illuminated static sign face, LED Frequency Display and Optional LED Traffic Lights:
Sign can be towed to site and un-hitched - outriggers are lowered to steady the trailer - bolts through
the outrigger feet can add further stability



- Each display has a 120V feed to a programmable module which displays the needed frequency
- Message changes can be made at the sign or through optional wireless modem
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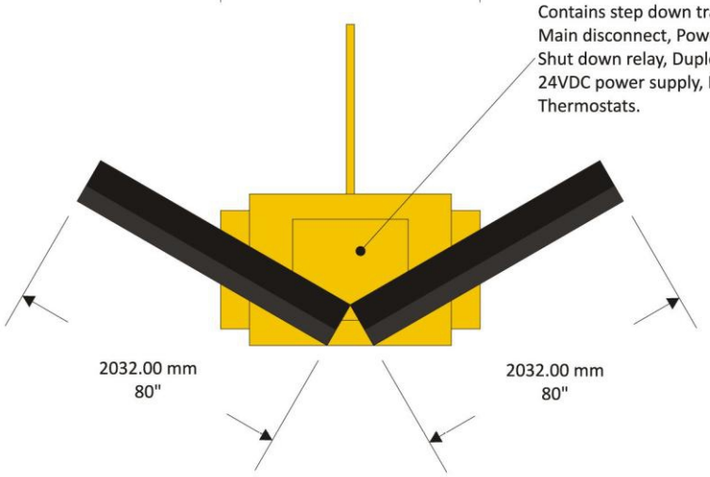

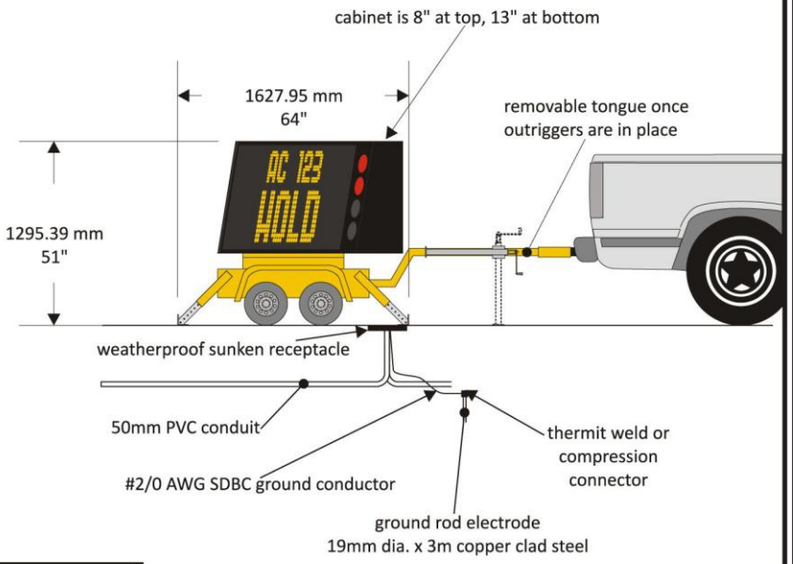

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COMMUNICATIONS - ENGINEERING - CONSULTING

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Patent#: 61/379,584

Scale: 1/4" = 1'

AIM Systems - Benefits

- *Maintain visual communications for aircraft and ground vehicles throughout the deicing process*
- *Provides safety through clear communication*
- *Decisive and direct messaging with instant updating*
- *Efficient transition through the deicing process allows for more aircraft to be deiced faster*

Current Installations

Toronto Pearson International (YYZ)

Toronto Pearson International (YYZ)

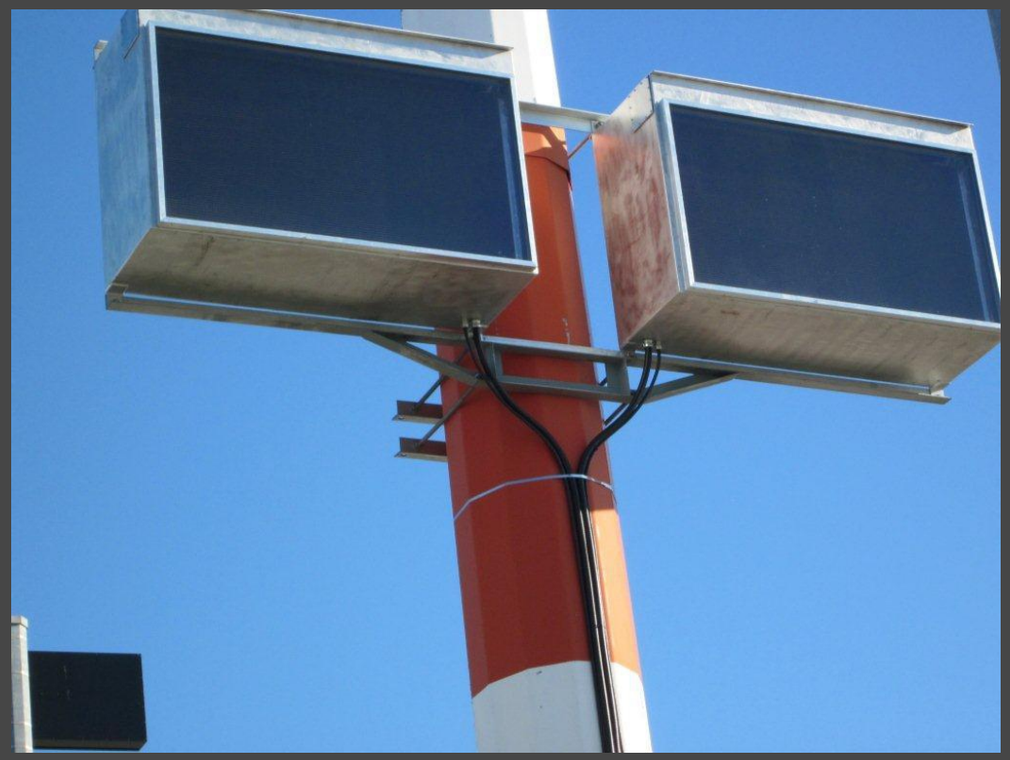
Toronto Pearson International (YYZ)

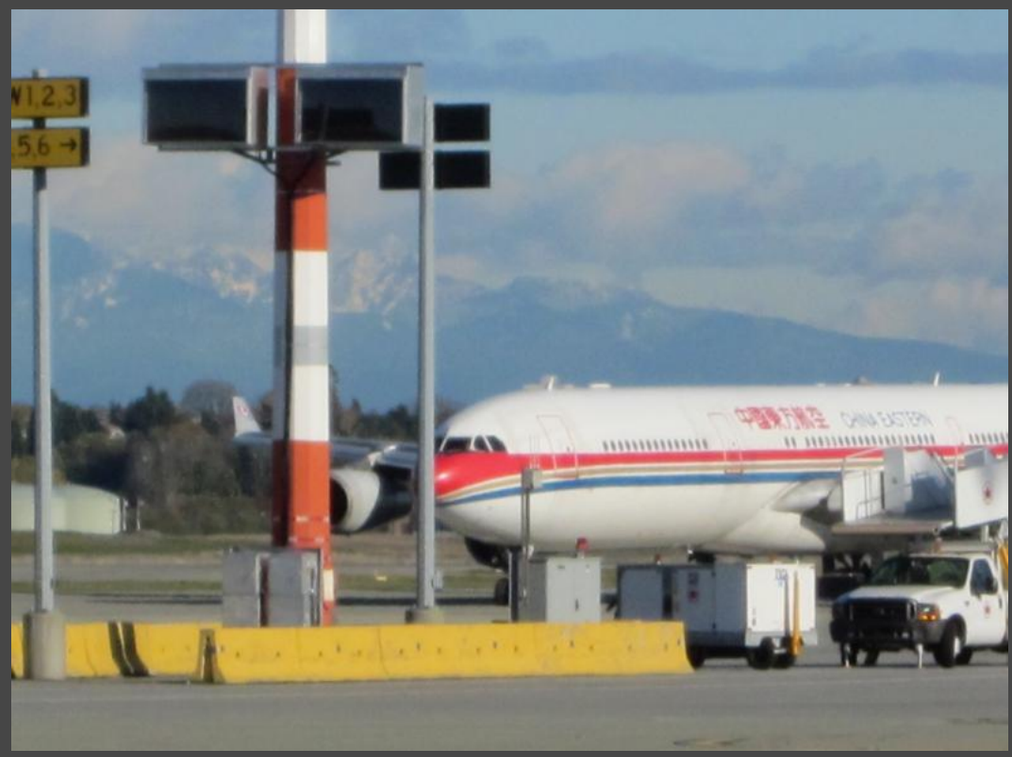
Toronto Pearson International (YYZ)

Vancouver International Airport (YVR)

AIM SYSTEMS

Vancouver International Airport (YVR)



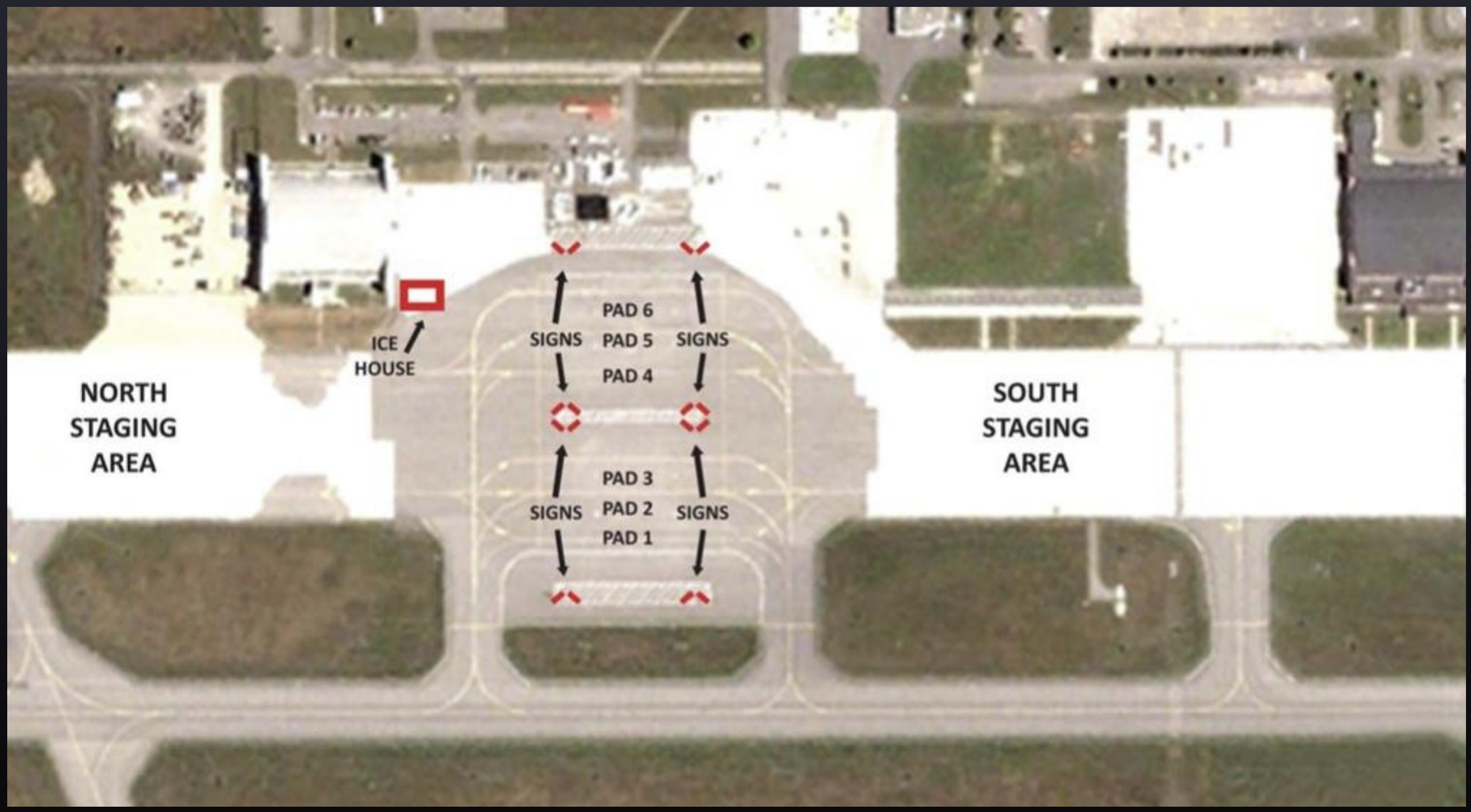


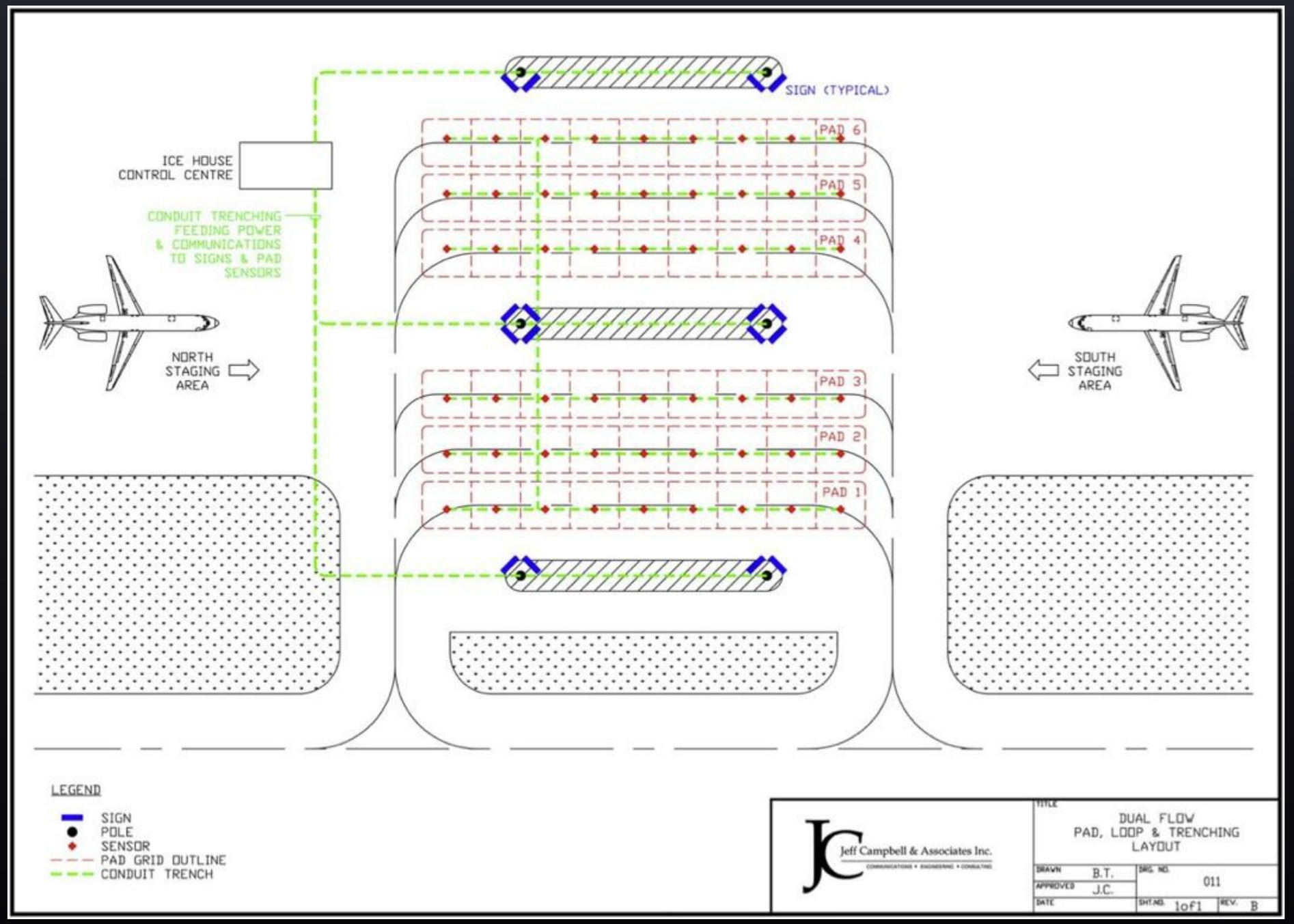
Vancouver International Airport (YVR)

Ottawa International (YOW)

Other Airport Solutions

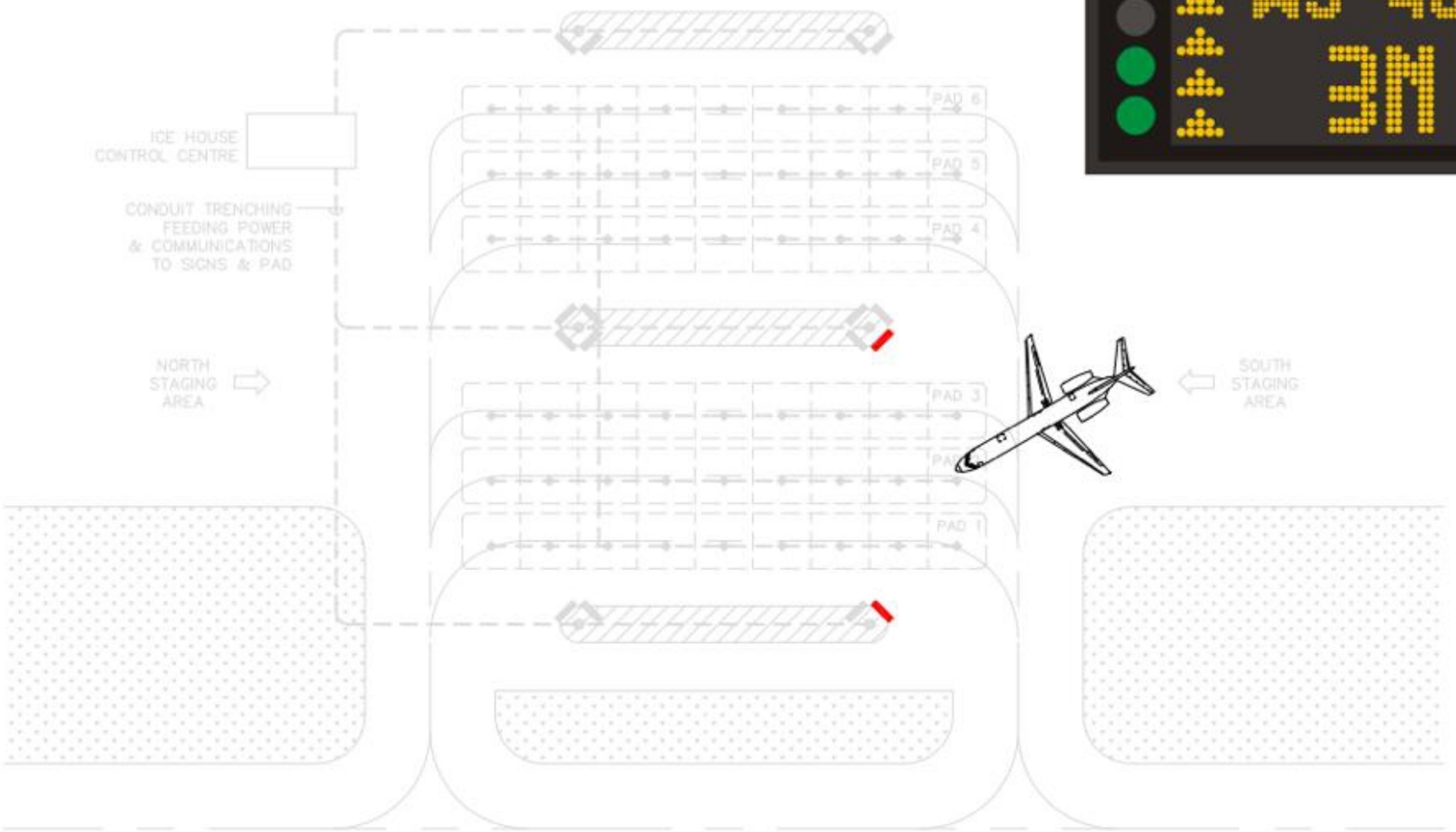
Ottawa International (YOW)


ICE
HOUSE
NORTH
STAGING
AREA
SIGNS
PAD 6
PAD 5
PAD 4
SIGNS
SOUTH
STAGING
AREA
SIGNS
PAD 3
PAD 2
PAD 1
SIGNS


SIGN (TYPICAL)
PAD 6
PAD 5
PAD 4
ICE HOUSE
CONTROL CENTRE
CONDUIT TRENCHING
FEEDING POWER
& COMMUNICATIONS
TO SIGNS & PAD
SENSORS
NORTH
STAGING
AREA
SOUTH
STAGING
AREA
PAD 3
PAD 2
PAD 1
LEGEND
SIGN
POLE
SENSOR
PAD GRID OUTLINE
CONDUIT TRENCH
Jeff Campbell & Associates Inc.
COMMUNICATIONS • ENGINEERING • CONSULTING
TITLE
DUAL FLOW
PAD, LOOP & TRENCHING
LAYOUT
DRAWN B.T.
APPROVED J.C.
DATE
DRG. NO. 011
SHT.NO. 1of1
REV. B

DUAL FLOW LAYOUT - STAGE ONE:

SAMPLE MESSAGE:



LEGEND

SIGN
POLE
SENSOR
PAD GRID OUTLINE
CONDUIT TRENCH

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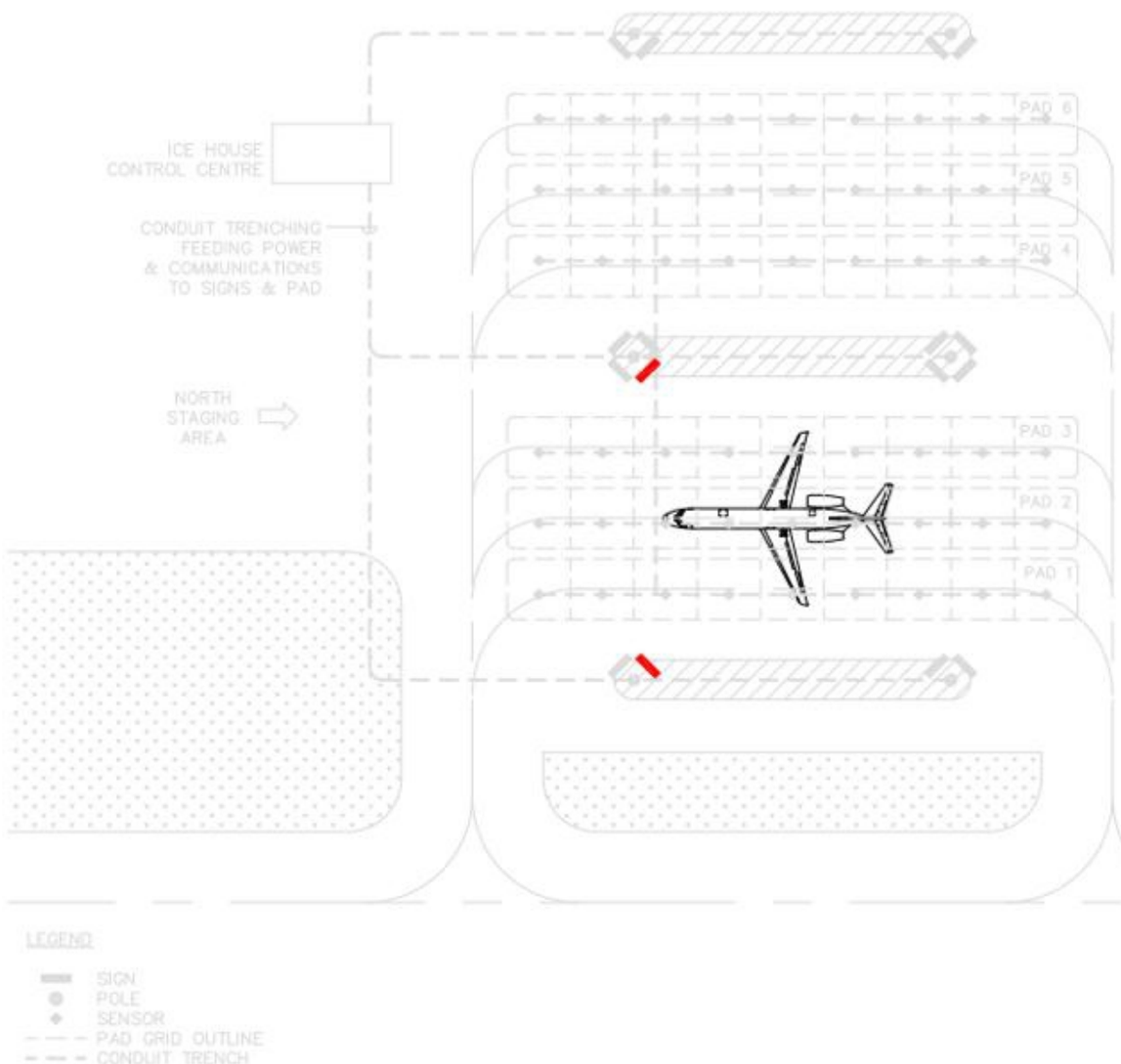
Proposal for: Moveable Directional LED Ground Signs

Date: April 26, 2010

Scale: NTS

AIM SYSTEMS

DUAL FLOW LAYOUT - STAGE TWO:



SAMPLE MESSAGES:

Jeff Campbell & Associates Inc.

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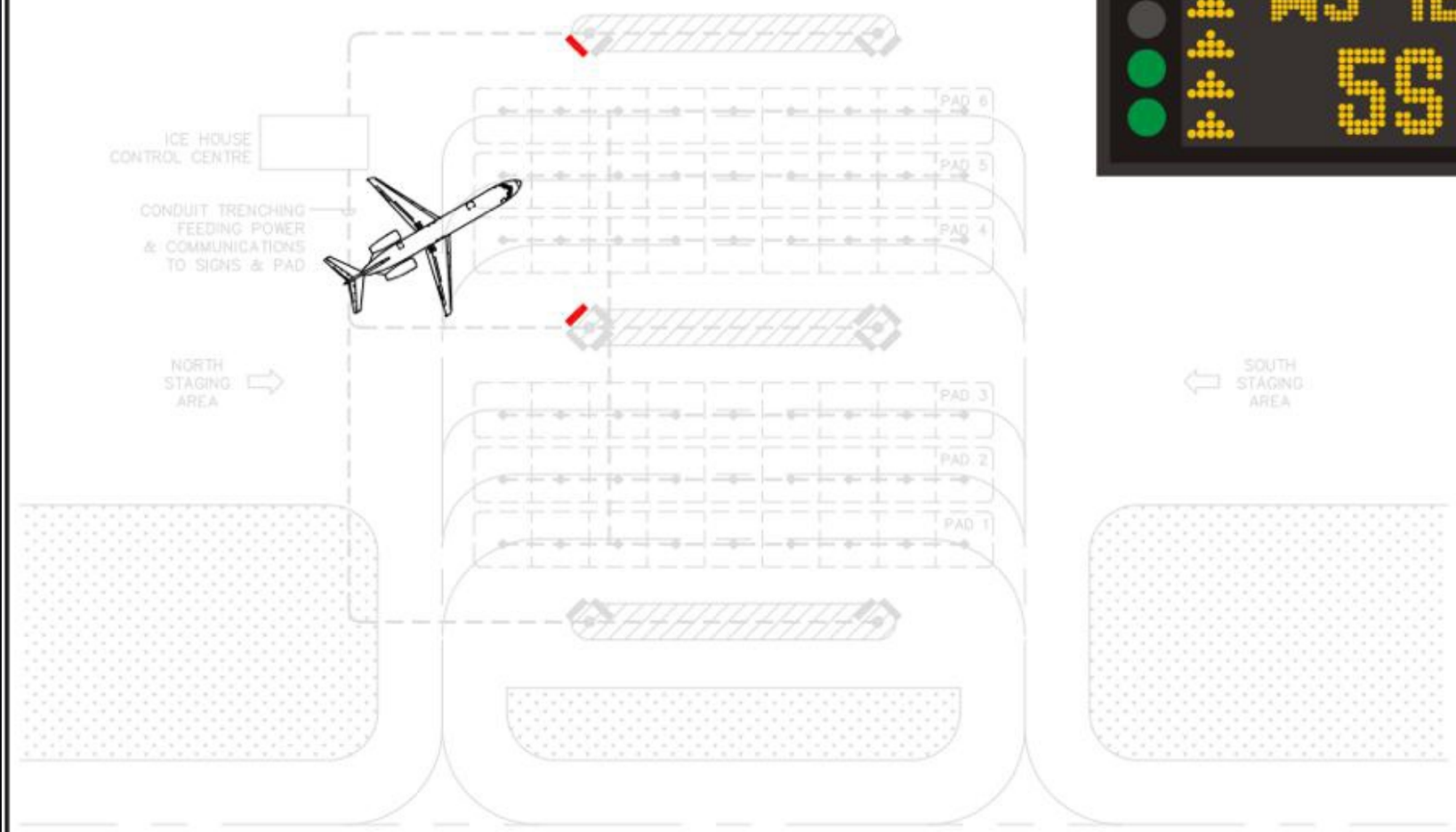
DUAL FLOW LAYOUT - STAGE THREE:

SAMPLE MESSAGE:



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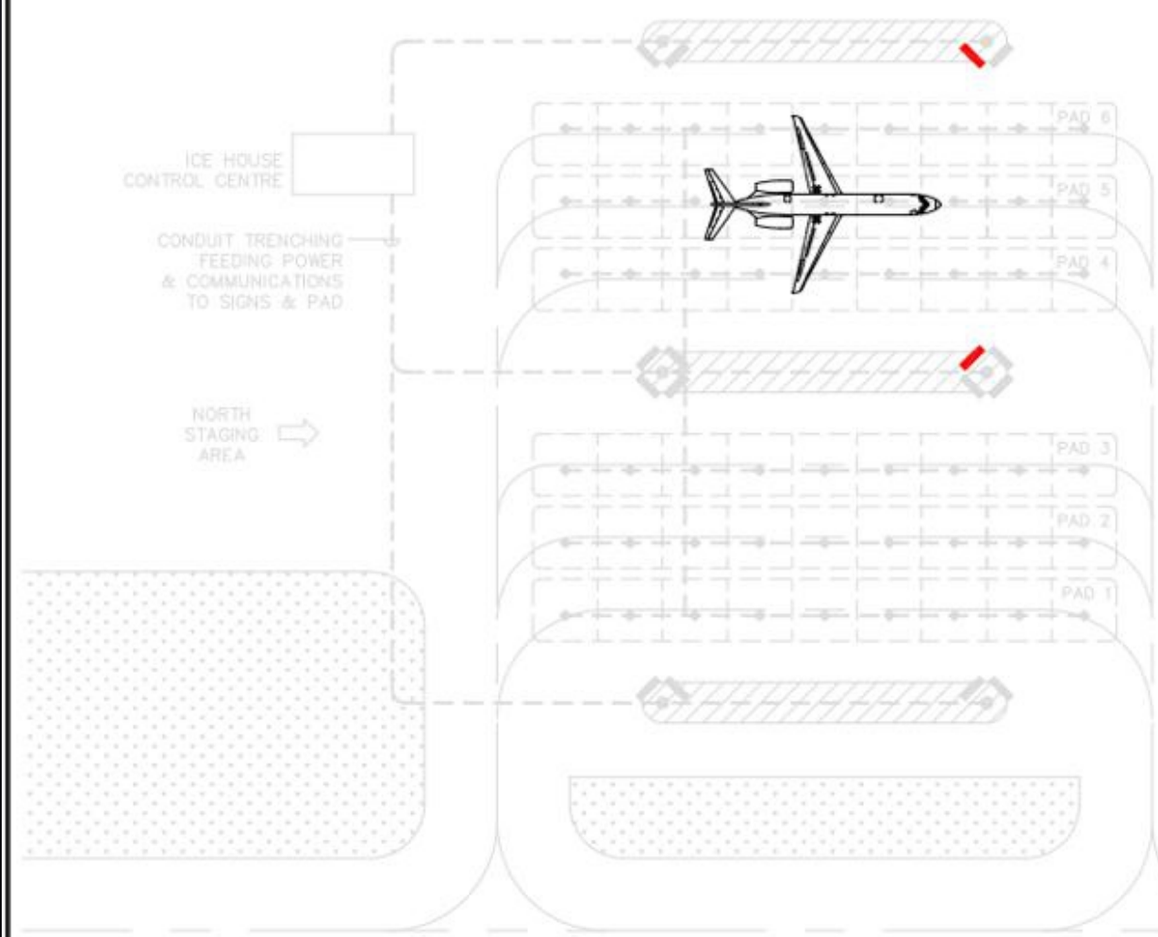
Scale: NTS


STOP

DUAL FLOW LAYOUT - STAGE FOUR:



SAMPLE MESSAGES:

LEGEND:
SIGN
POLE
SENSOR
PAD GRID OUTLINE
CONDUIT TRENCH

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Scale: NTS


HOLD
131.375

Philadelphia International (PHL)


Pad#7 VMB
Pad#5&6 VMB
Pad#3&4 VMB
Pad#2 VMB
Pad#1 VMB
Main Directory VMB


DE ICE↗


AP 123
PROCEED BAY 1

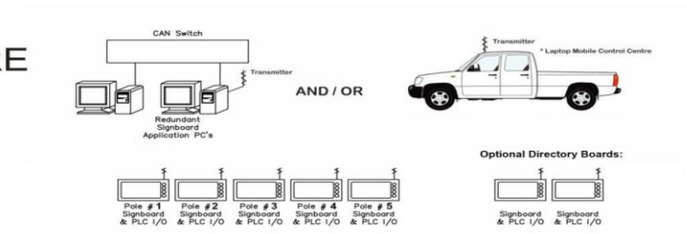
Bay Manager System

Bay Manager System

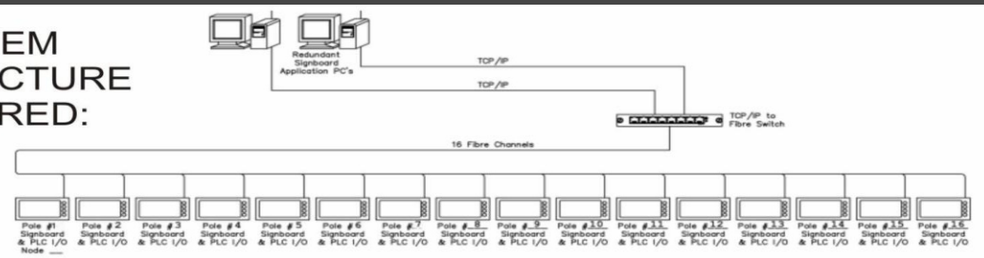
- *AIM System Bay Manager program has been developed to track aircraft movements and other operational events associated with aircraft deicing by means of a graphical visual interface and to record such events*

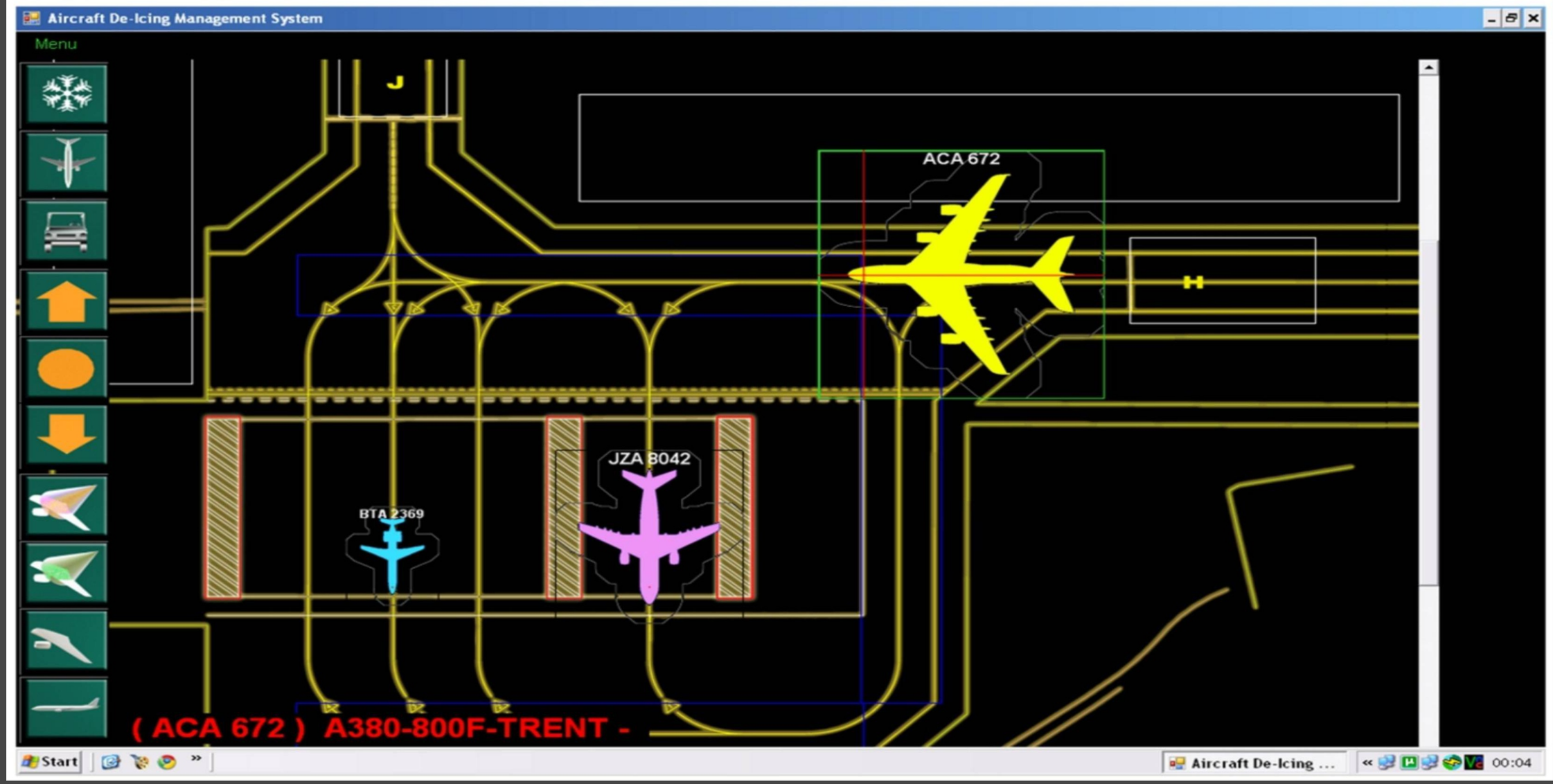
- *Aids and facilitates pad management and control function by providing situational awareness during live operations and populates an event database from which statistics and functional reviews can be derived*

SYSTEM ARCHITECTURE WIRELESS:



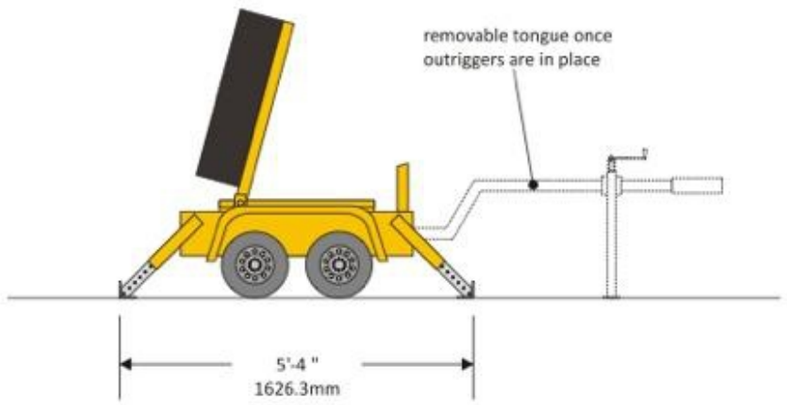
SYSTEM ARCHITECTURE TETHERED:

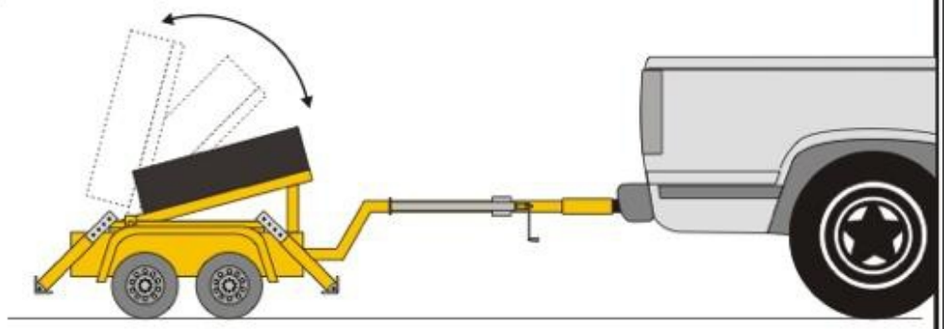




Future Applications

Moveable LED Frequency Sign - Cabinet with Internally Illuminated static sign face, LED Frequency Display and Optional LED Traffic Lights:
Sign can be towed to site and un-hitched - outriggers are lowered to steady the trailer - bolts through the outrigger feet can add further stability
Sign board mechanically lowers and raises into position





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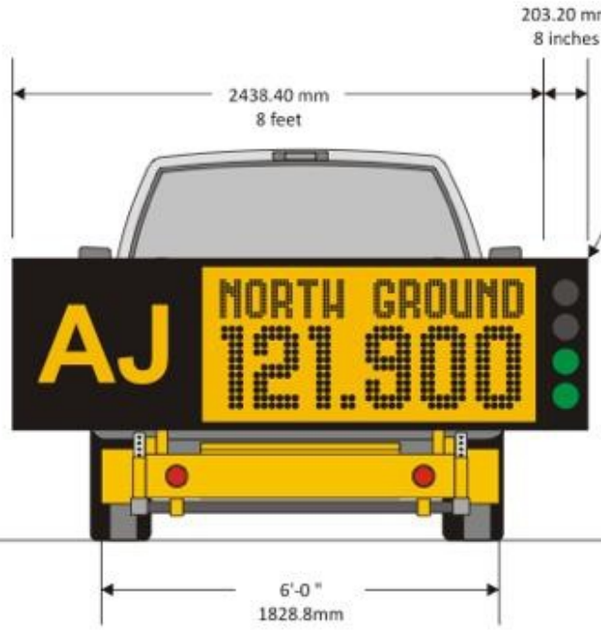

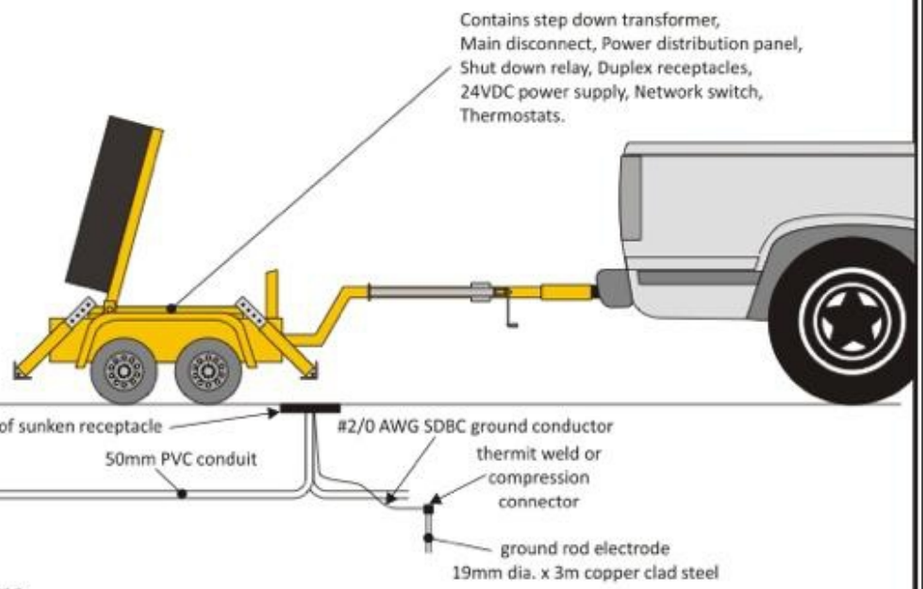

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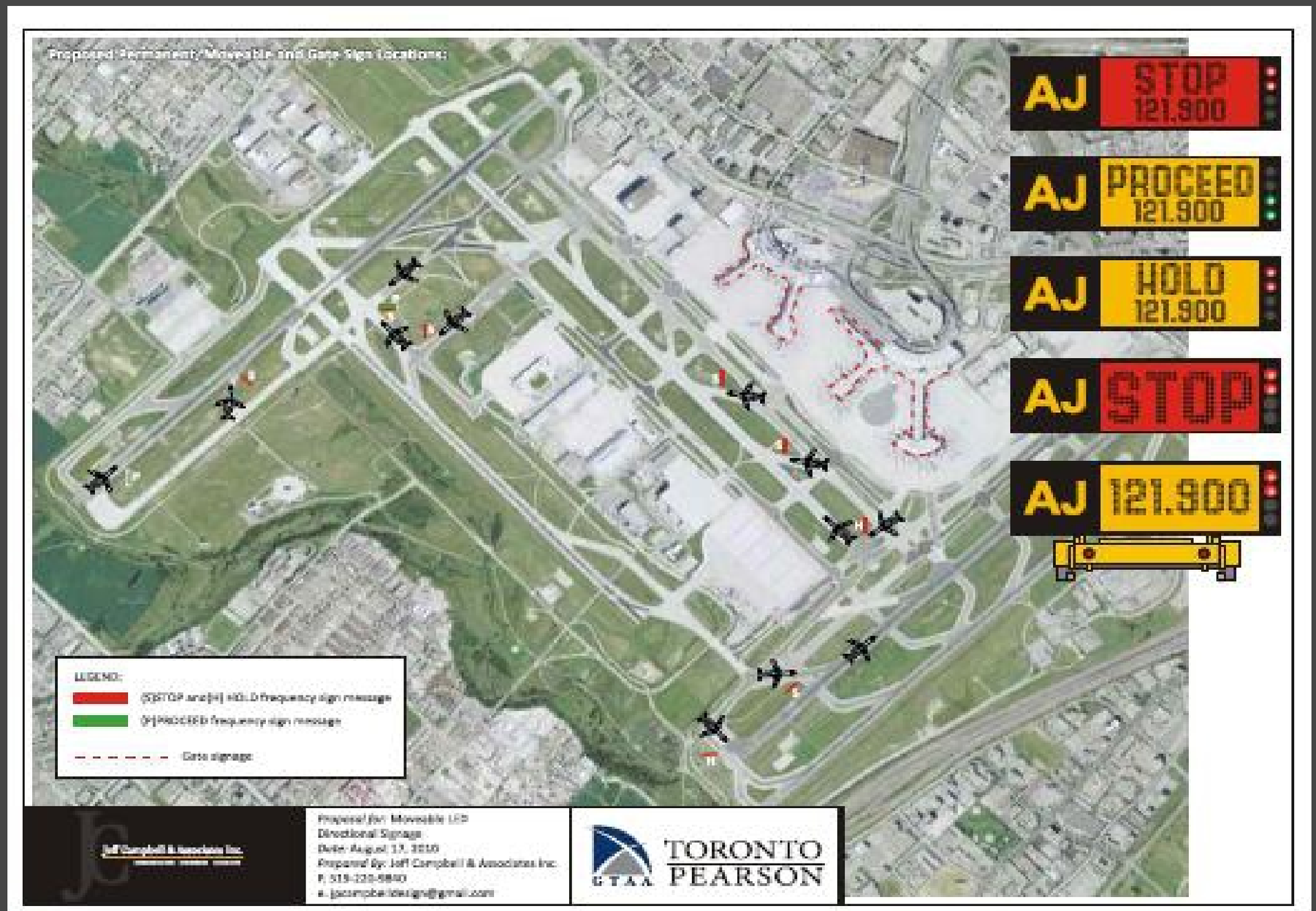
Scale: 3/8" = 1'


Proposed Permanent/Moveable and Gate Sign Locations:
AJ STOP 121.900
AJ PROCEED 121.900
AJ HOLD 121.900
AJ STOP
AJ 121.900
LEGEND:
(S)STOP and (H) HOLD frequency sign message
(P) PROCEED frequency sign message
Gate signage
Jeff Campbell & Associates Inc.
Proposal for: Moveable LED
Directional Signage
Date: August 17, 2010
Prepared By: Jeff Campbell & Associates Inc.
P. 519-220-5840
e. jpcampbelldesign@gmail.com
GTAA TORONTO PEARSON


CYUL 1300
SN+ R34 T-3
HOT T1 3
HOT T4 34

Summary

Summary

- *Need for visual systems for engines-on deicing operations has been identified*
- *AIM Systems provide turnkey solutions to meet airport-specific operational requirements, from concept and design through installation and implementation*