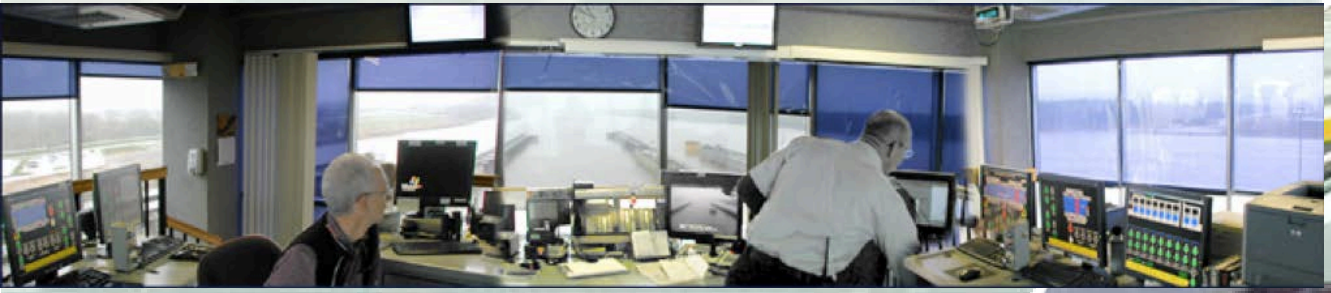
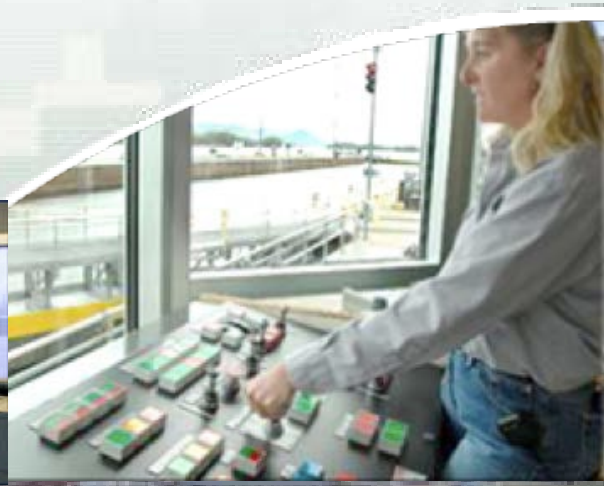
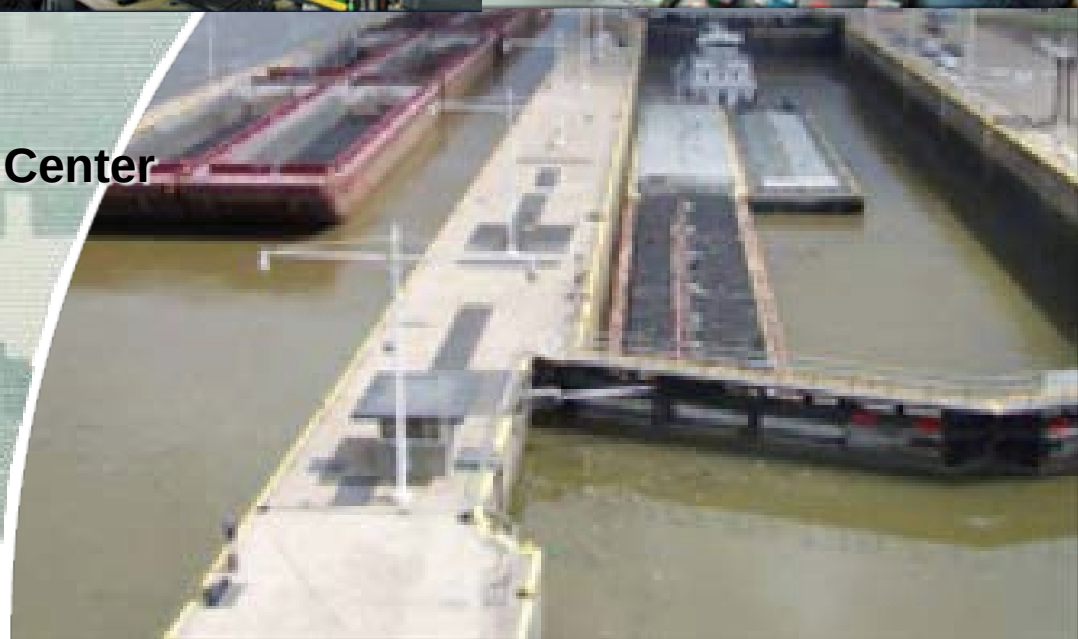
US Army Corps of Engineers
e-Navigation projects update

Inland ENC Harmonization Group
15 October 2013





Brian Tetreault
US Army Corps of Engineers
Engineer Research & Development Center
Coastal and Hydraulics Laboratory



US Army Corps of Engineers
BUILDING STRONG®

e-Navigation

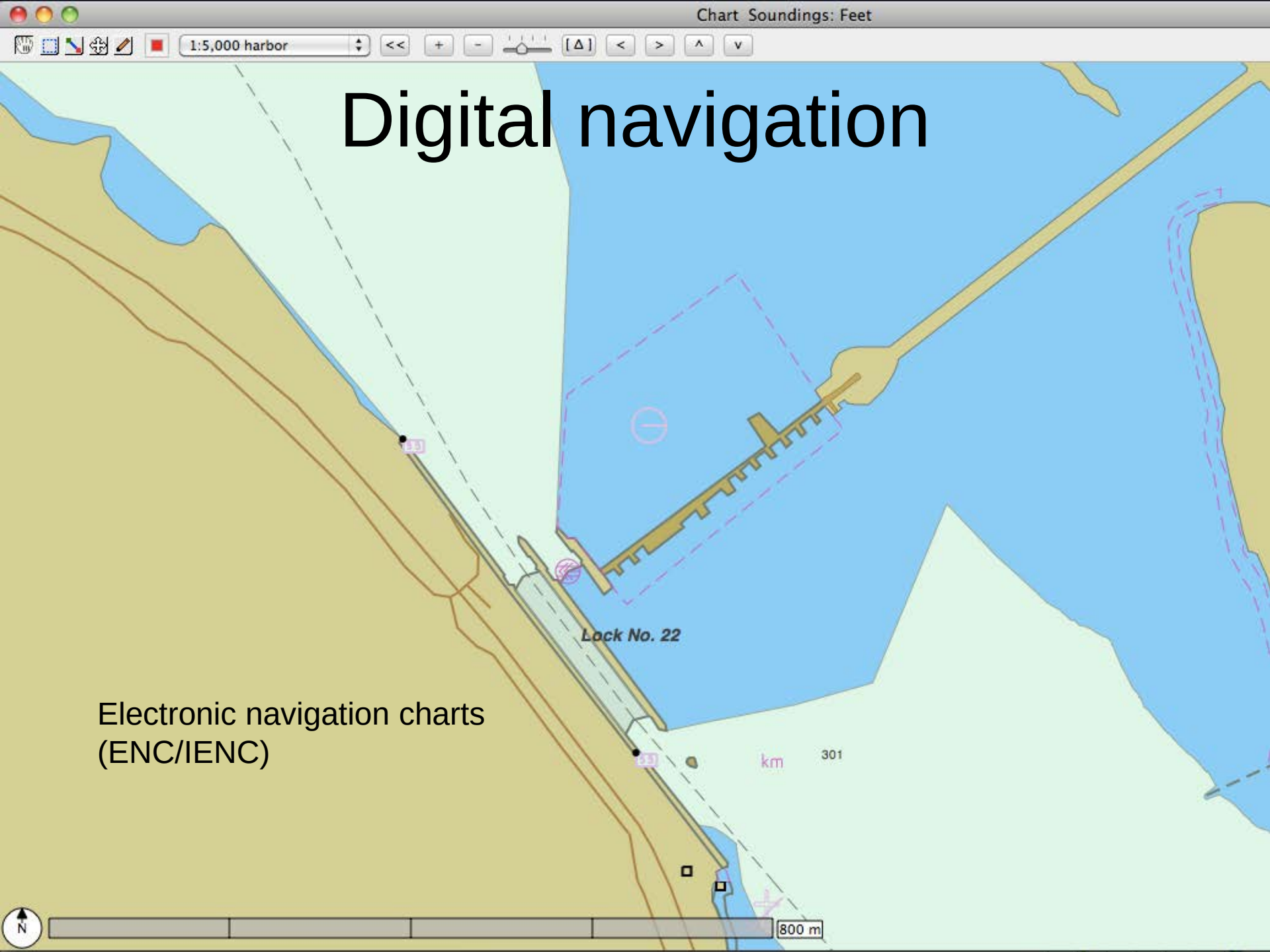
International definition:

"e-Navigation is the harmonised collection, integration, exchange, presentation and analysis of maritime information onboard and ashore by electronic means to enhance berth to berth navigation and related services, for safety and security at sea and protection of the marine environment"

MSC85/26/Add.1 annex 20

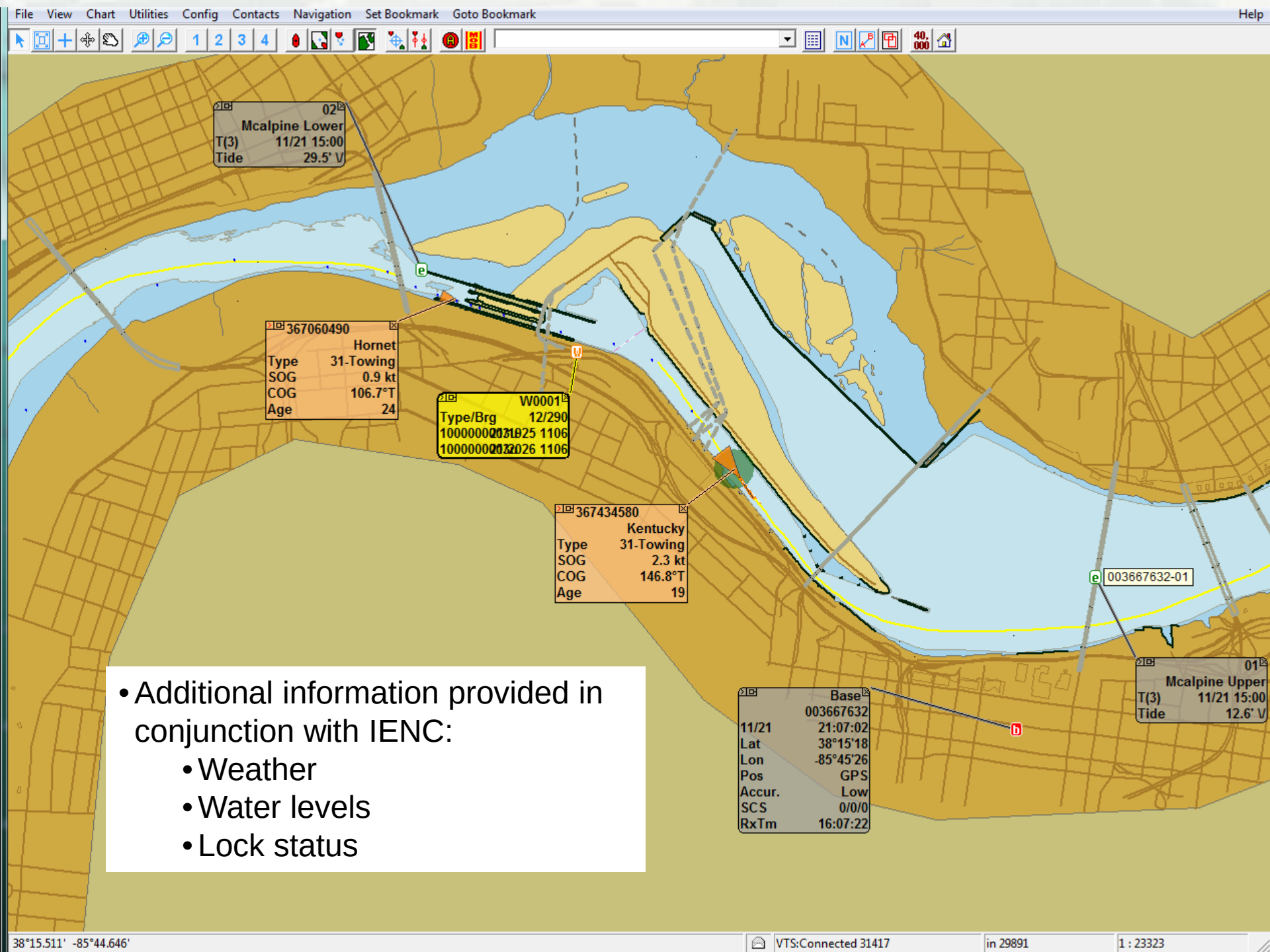
Analog navigation

- Paper charts
- Manual positioning
- Voice communications
- Visual aids to navigation



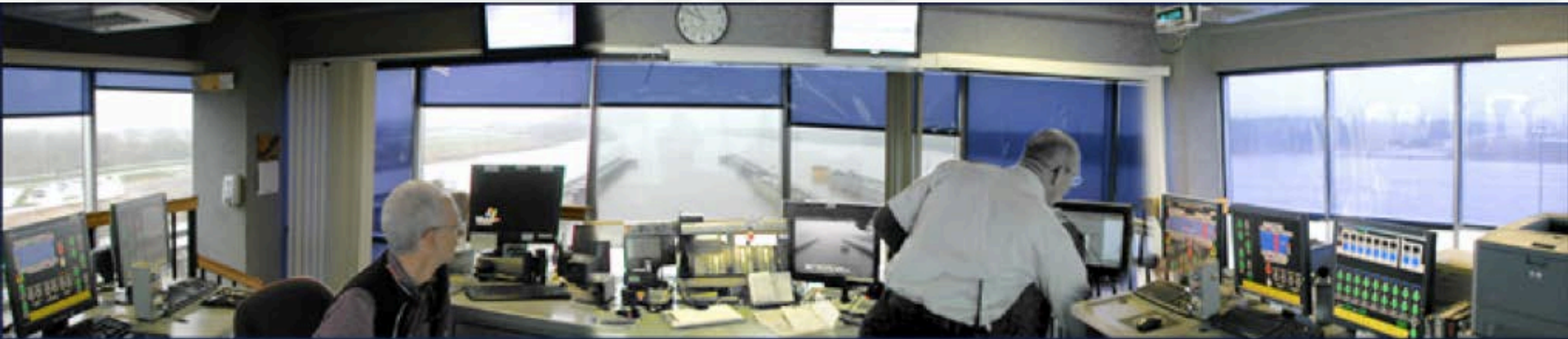
Electronic navigation charts
(ENC/IENC)

27
26
25
24
23
22
21
20


File View Chart Utilities Config Contacts Navigation Set Bookmark Goto Bookmark Help
02
Mcalpine Lower
T(3) 11/21 15:00
Tide 29.5' V
367060490
Hornet
Type 31-Towing
SOG 0.9 kt
COG 106.7°T
Age 24
W0001
Type/Brg 12/290
367434580
Kentucky
Type 31-Towing
SOG 2.3 kt
COG 146.8°T
Age 19
003667632-01
Base
003667632
11/21 21:07:02
Lat 38°15'18
Lon -85°45'26
Pos GPS
Accur. Low
SCS 0/0/0
RxTm 16:07:22
01
Mcalpine Upper
T(3) 11/21 15:00
Tide 12.6' V
• Additional information provided in conjunction with IENC:
• Weather
• Water levels
• Lock status
38°15.511' -85°44.646'
VTS:Connected 31417
in 29891
1 : 23323

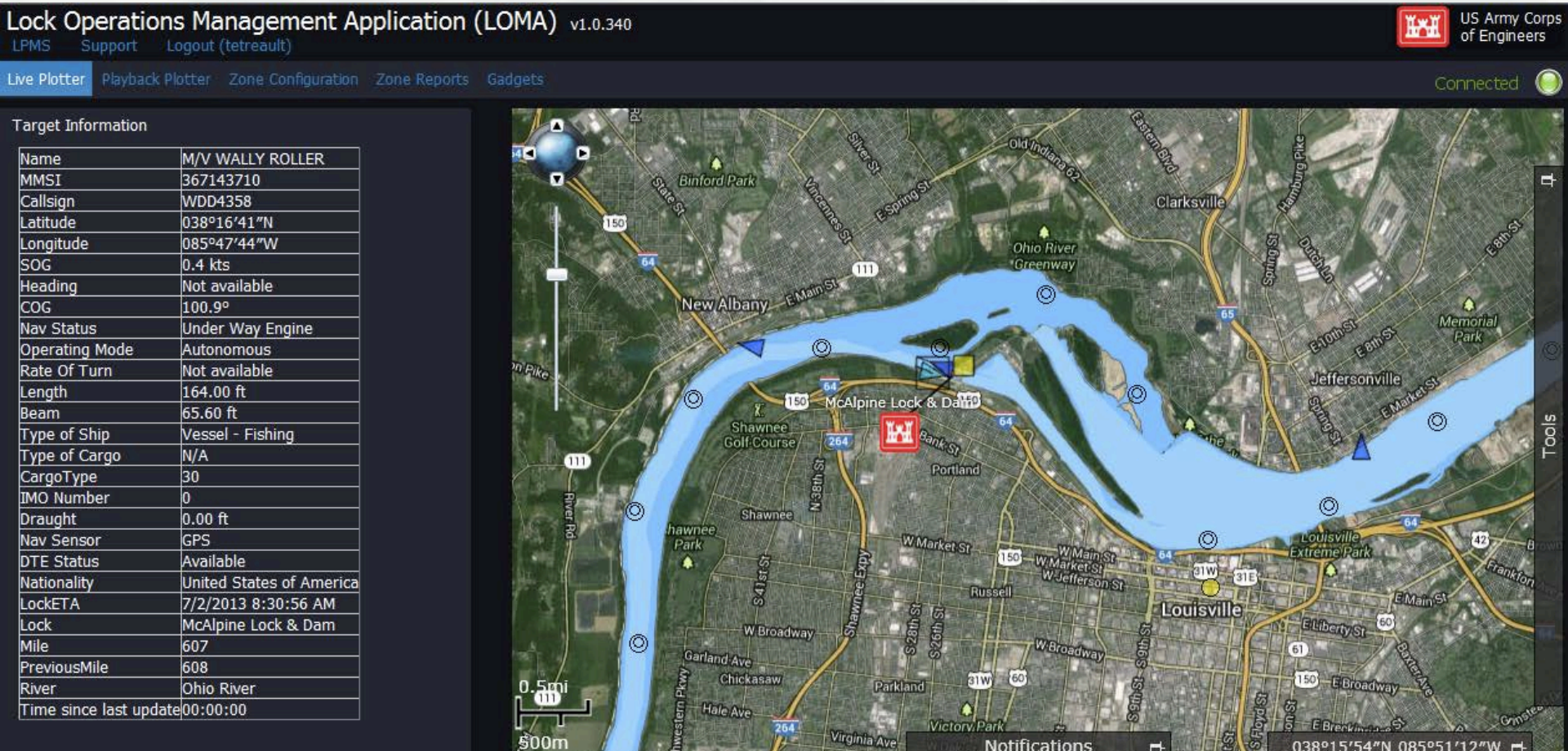
Lock Operations Management Application (LOMA)

- Purpose:
  - Provide end users information needed for decision support
- Goals:
  - Increase lock operator situational awareness
  - Provide vessel operators better information
  - Provide better information to Corps management
  - Exchange information with external users
- AIS is the central LOMA technology



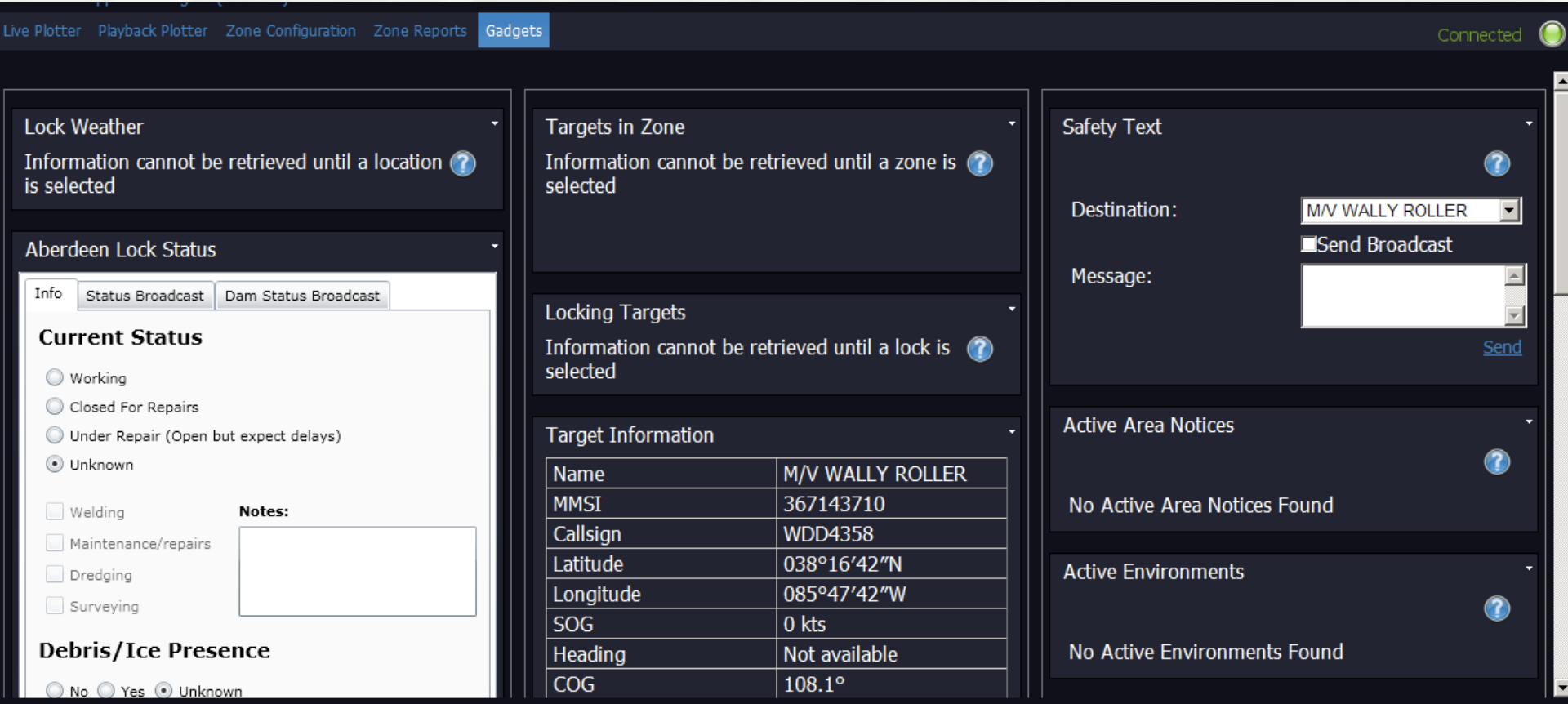
LOMA Lock Operator Interface

- Situational display
- AIS vessel information
- Zone management
- Playback capability



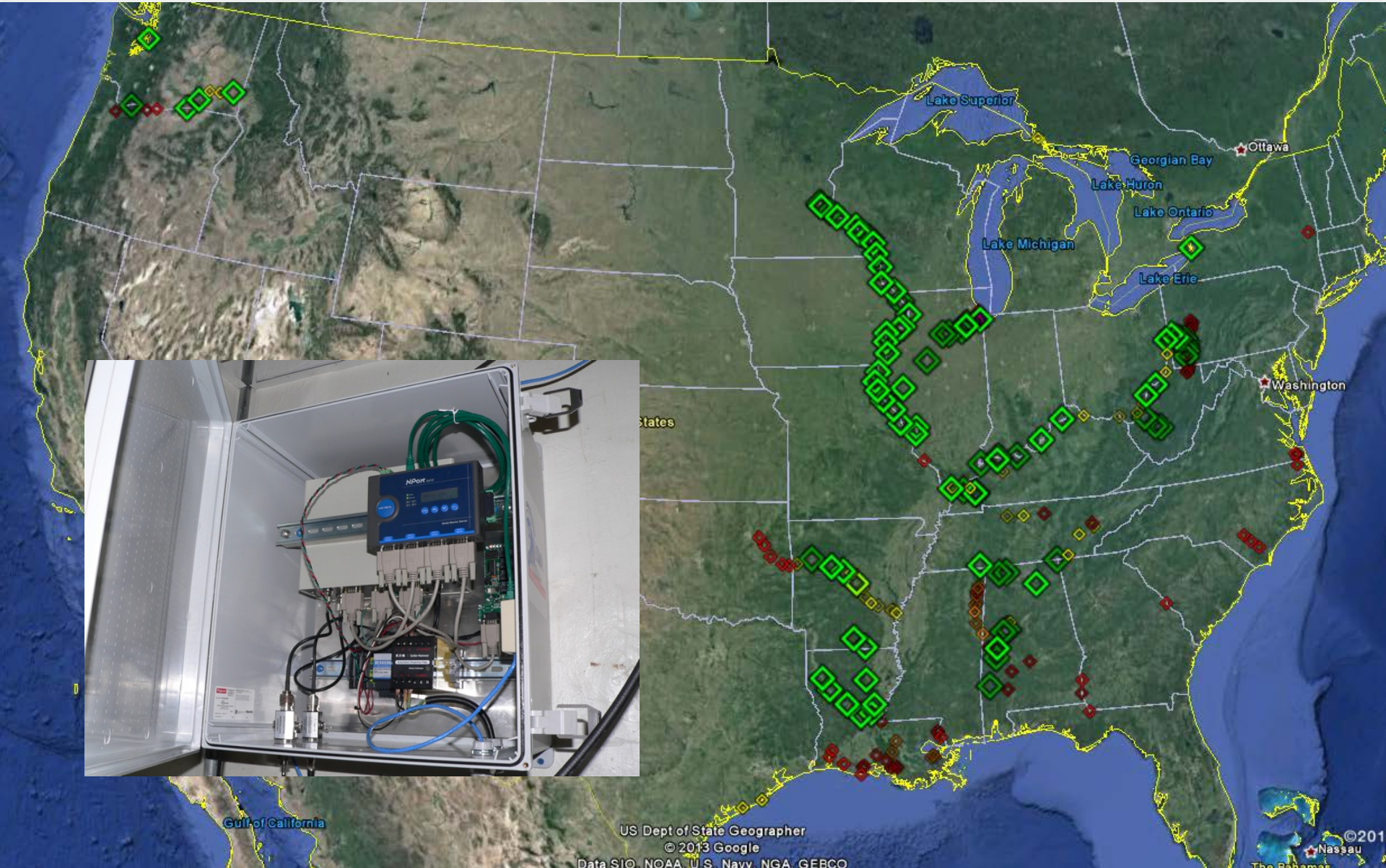
Current LOMA Capabilities – AIS Transmit

- Safety text messages
- Area Notices
- Lock Status
- Water levels



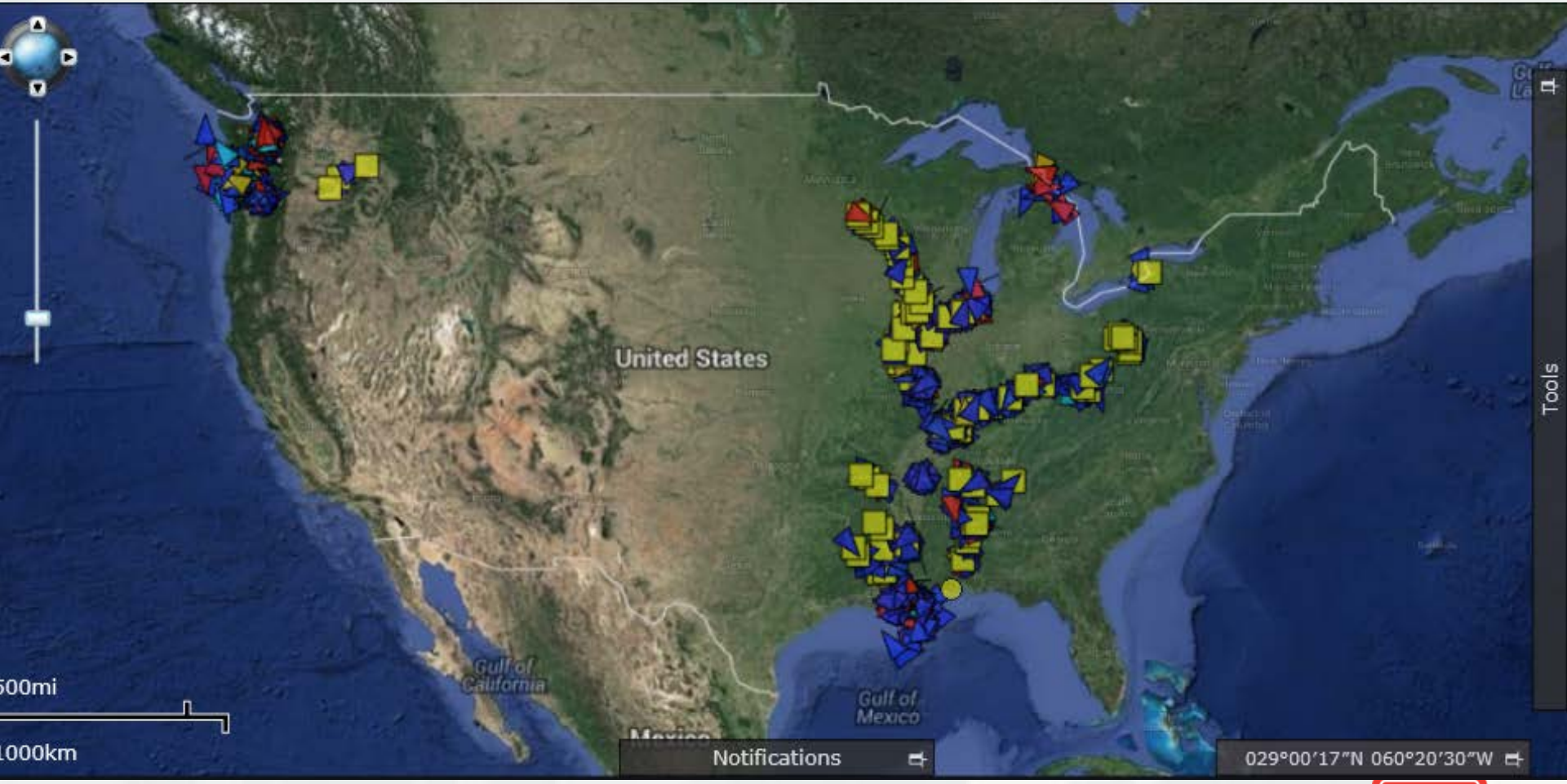
AIS Equipment Deployment

(as of August 2013)



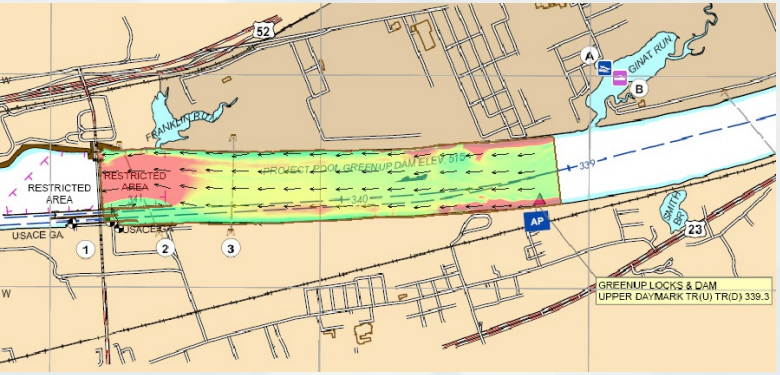
AIS Equipment Deployment

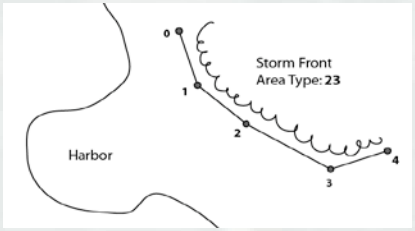
(as of August 2013)

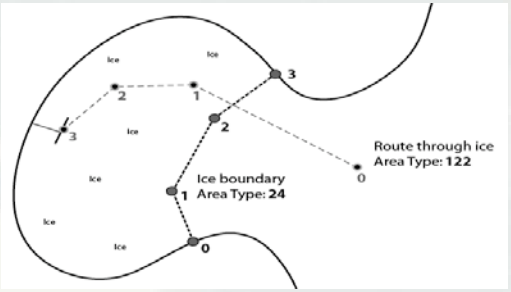


Future Capabilities

- Lock approach hydrodynamic modeling
- Navigation information via AIS
- Possibilities…



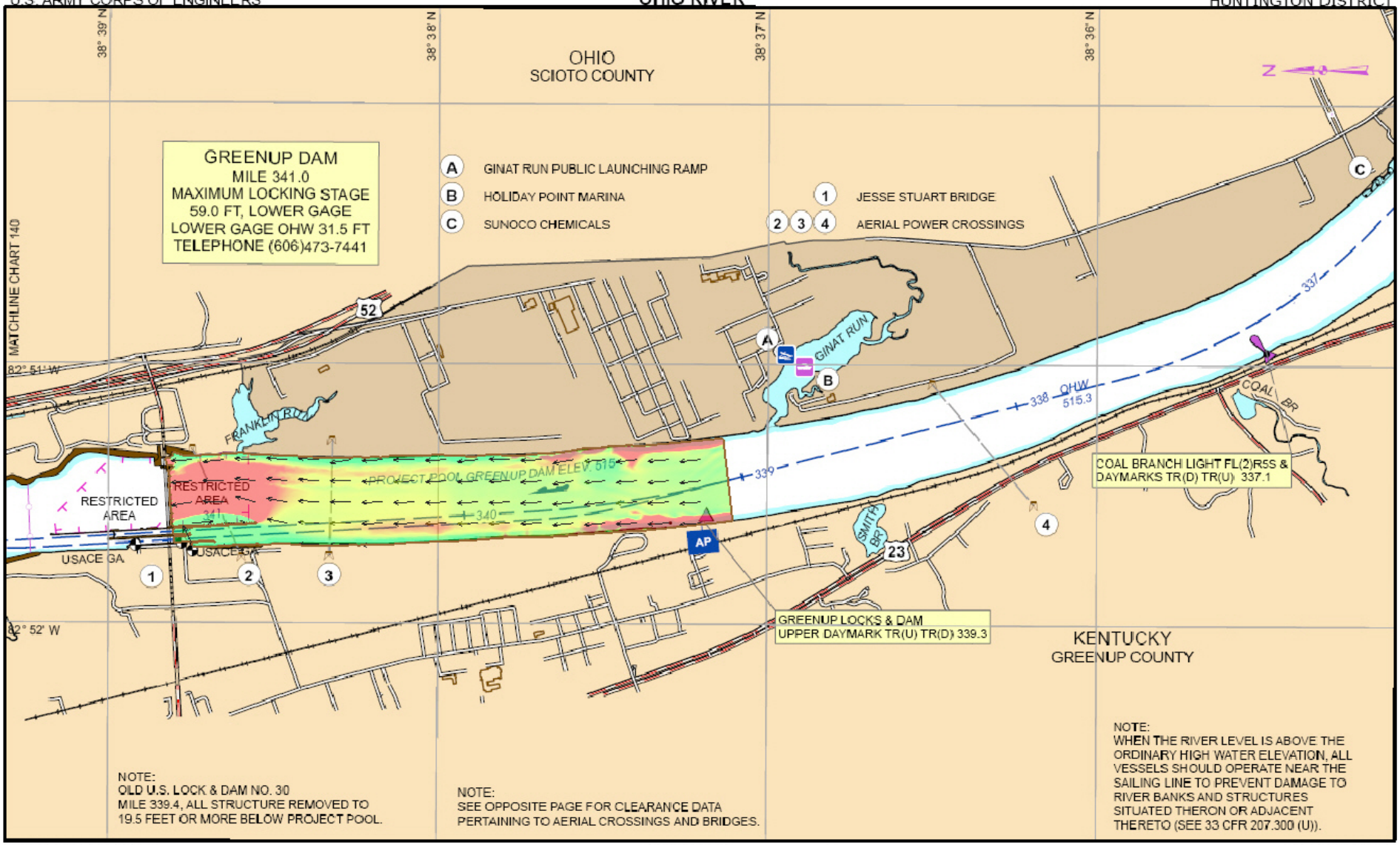




U.S. ARMY CORPS OF ENGINEERS

OHIO RIVER

HUNTINGTON DISTRICT



REVISED JUNE 2009

SCALE : 1" = 2000'
1,000 0 1,000 2,000 3,000 Feet

CHART NO. 141
RIVER MILE 336.6 - 341.6

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ld22us_162k_dep_ss - Notepad

File Edit Format View Help

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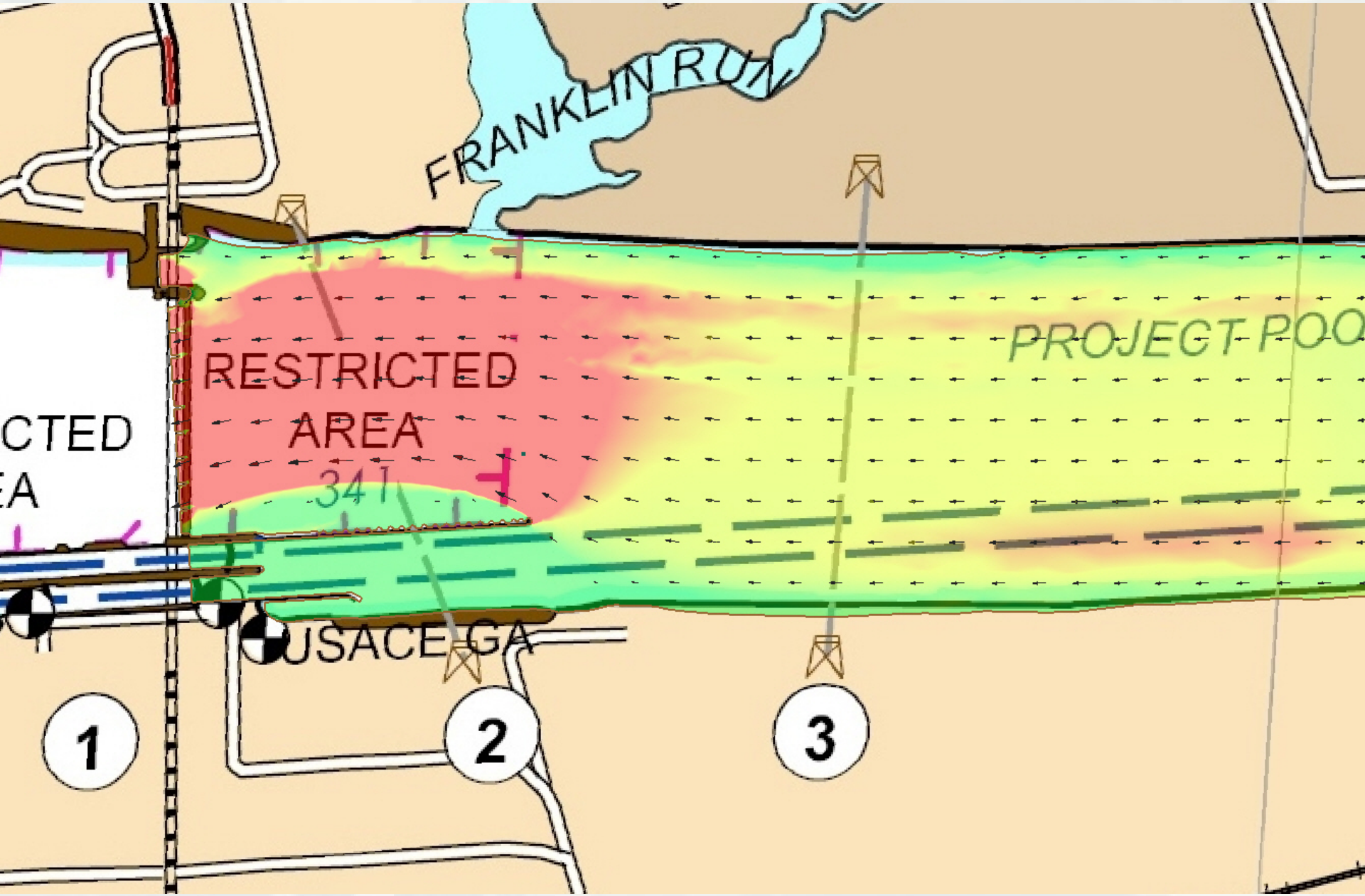
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341
PROJECT POO
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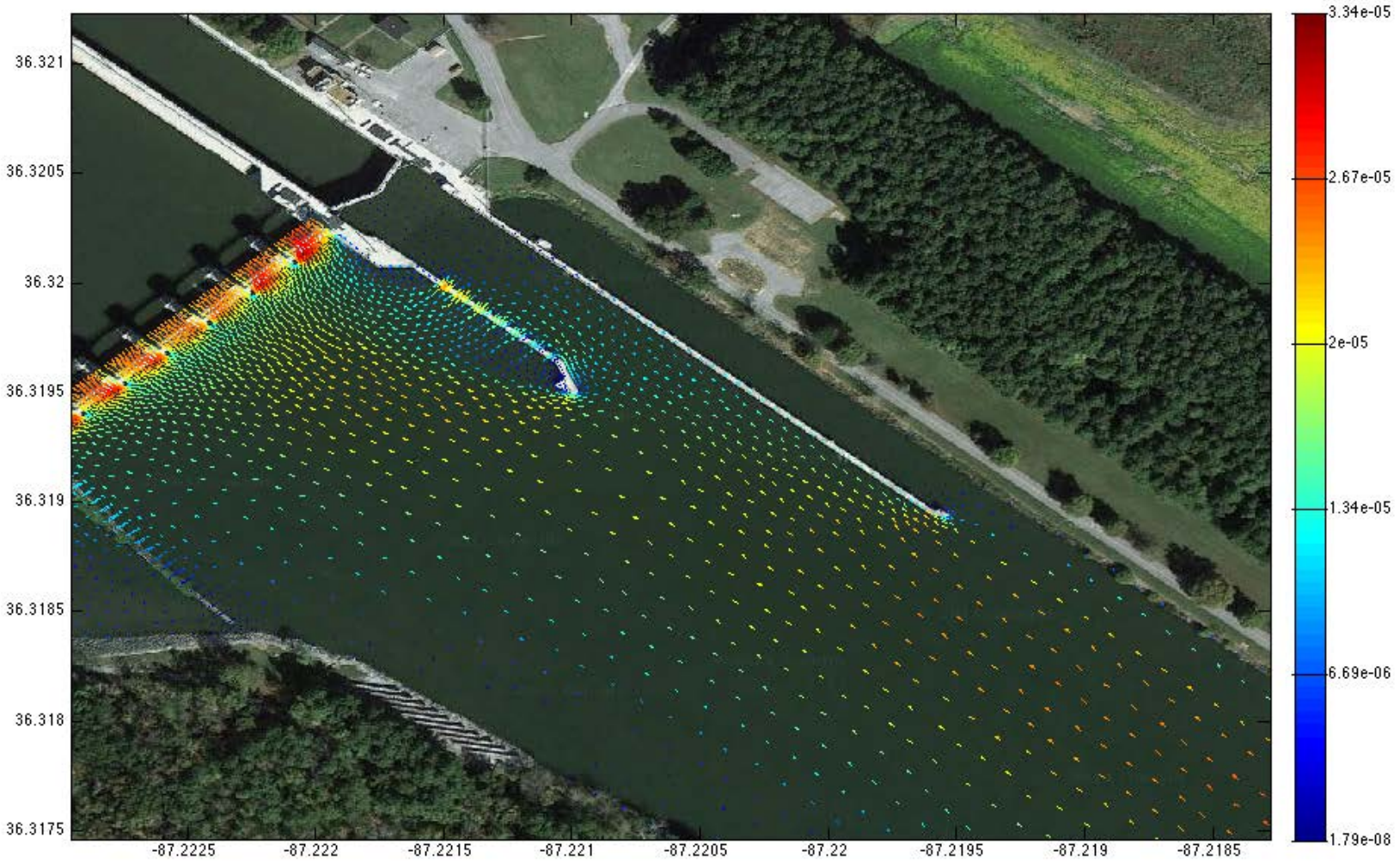
2
3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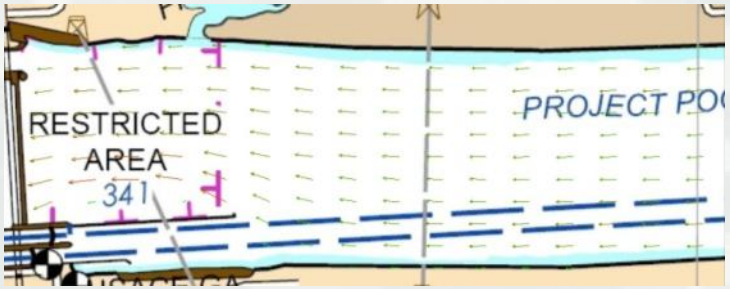

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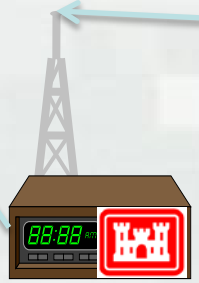
Convert to ASM

LOMA

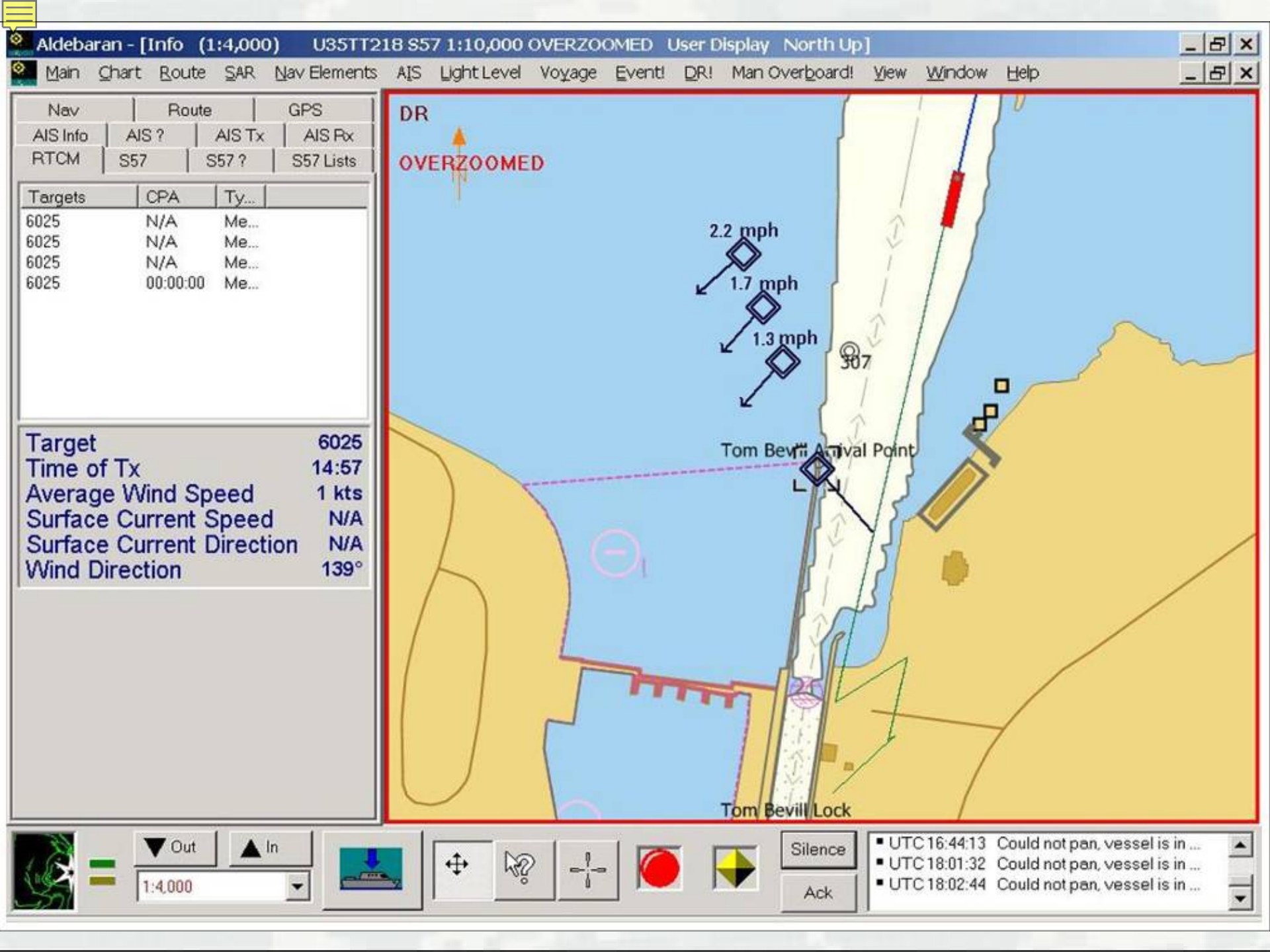


AIS units at Locks

Model input:
- Bathymetry
- Structure plans
- Dam discharge
-Surface elevation (pool)

AIS message

Payload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Nav Route GPS
AIS Info AIS ? AIS Tx AIS Rx
RTCM S57 S57 ? S57 Lists
Targets CPA Ty...
6025 N/A Me...
6025 N/A Me...
6025 N/A Me...
6025 00:00:00 Me...
Target 6025
Time of Tx 14:57
Average Wind Speed 1 kts
Surface Current Speed N/A
Surface Current Direction N/A
Wind Direction 139°
DR
OVERZOOMED
2.2 mph
1.7 mph
1.3 mph
307
Tom Bevill Arrival Point
Tom Bevill Lock
Out
In
1:4,000
Silence
Ack
UTC 16:44:13 Could not pan, vessel is in ...
UTC 18:01:32 Could not pan, vessel is in ...
UTC 18:02:44 Could not pan, vessel is in ...

Other ways to communicate or portray current information

- “Red-Yellow-Green”
- “Go – no-go”
- Text
- Not just ECS – other equipment or displays?

Navigation information via AIS

- Use AIS capability to transmit information on river conditions
  - “e-AtoN”
  - Information extracted from survey data
  - Area notices (e.g., points, polyline, polygons) to indicate survey conditions
    - Depth points/areas/lines
    - Recommended sailing line

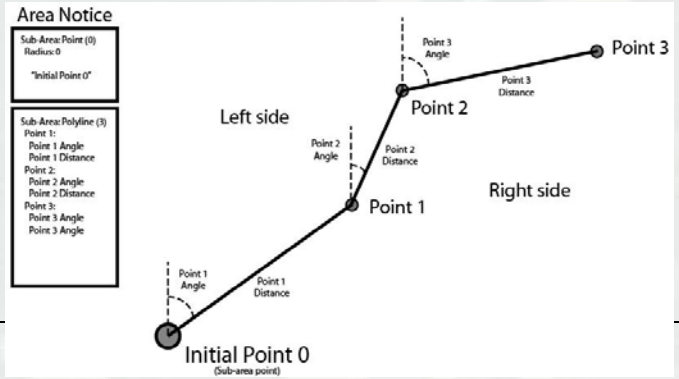
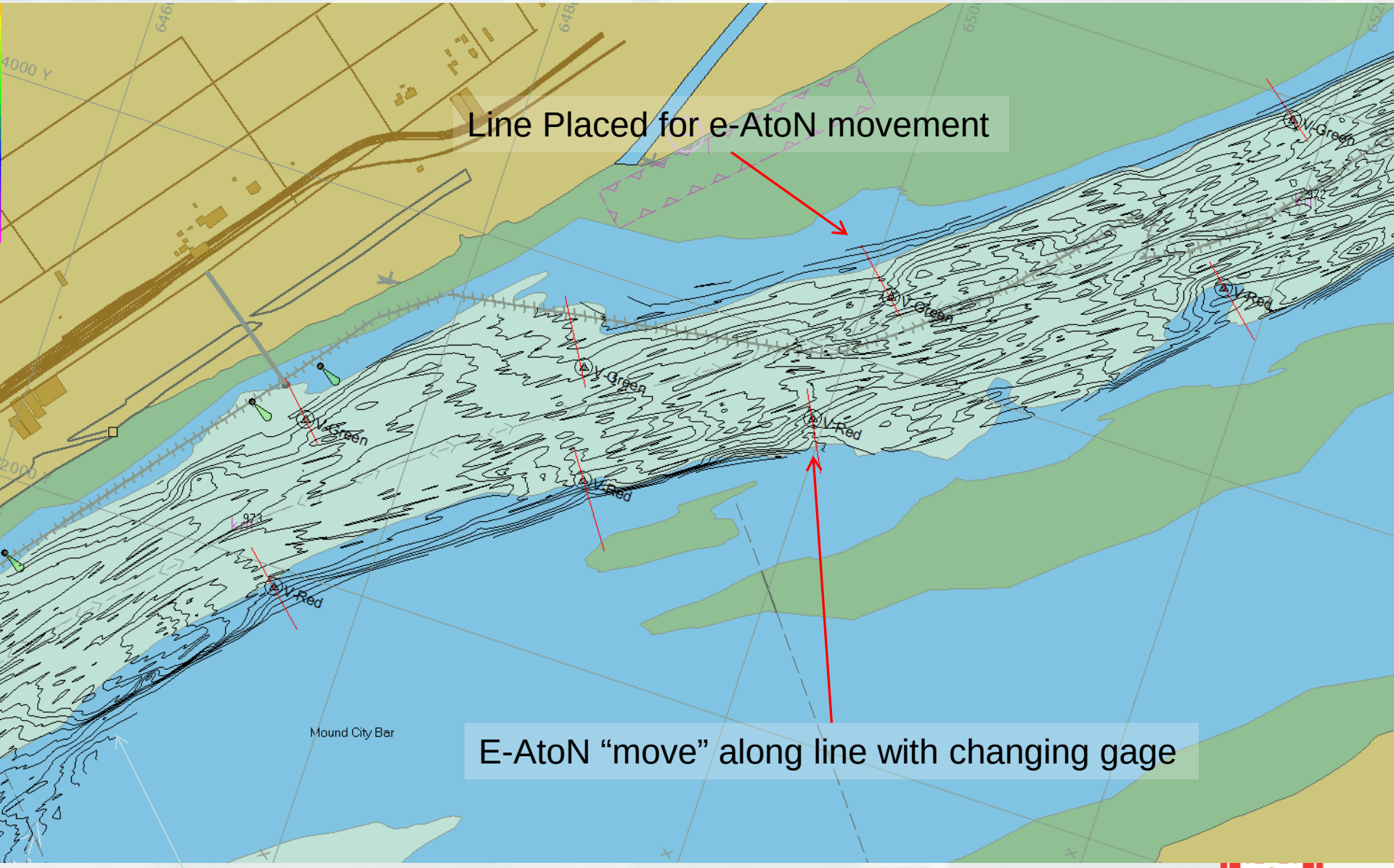


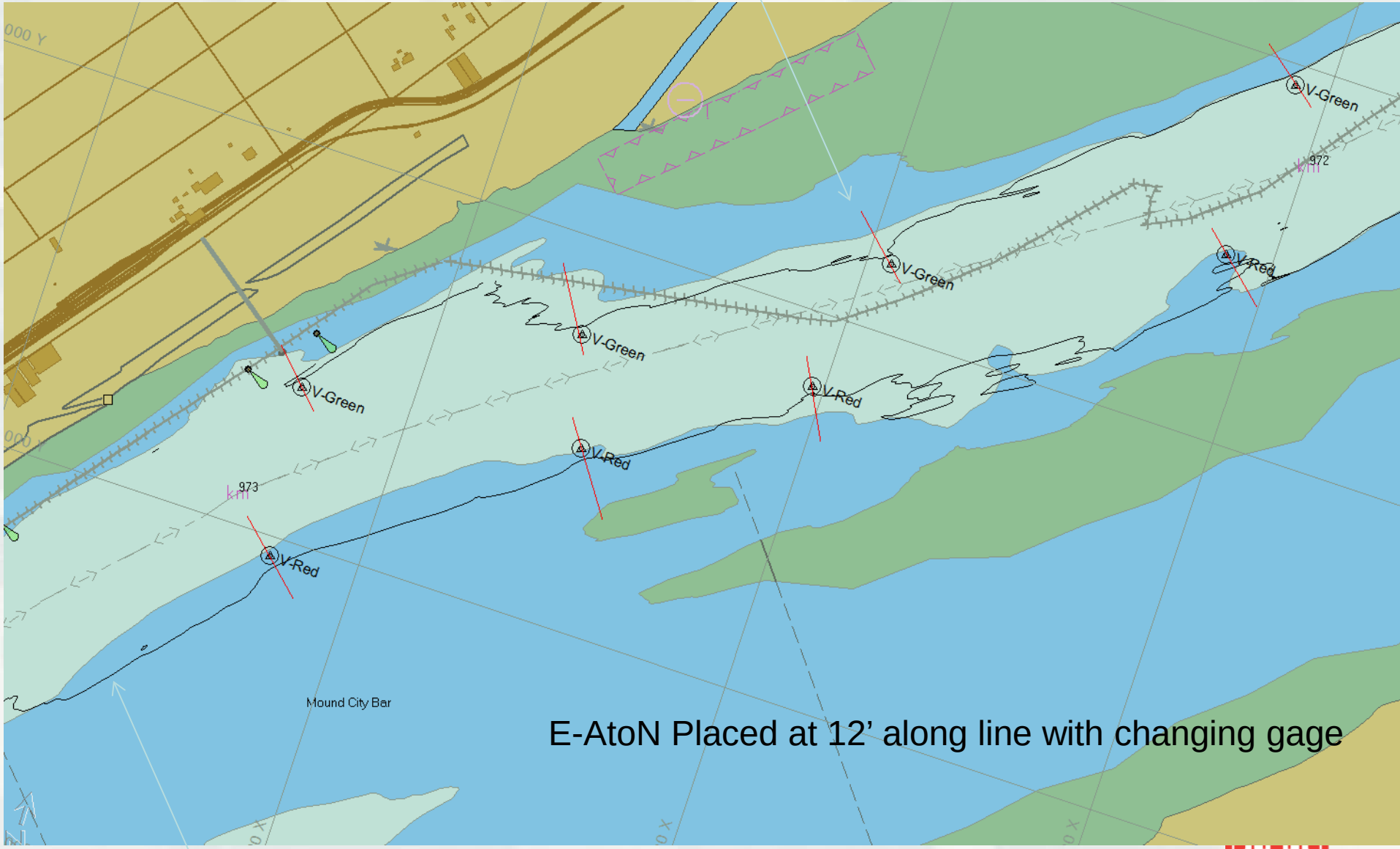
Table 4: Other Symbols

Topic	Symbol	Description
AIS Based AtoN Real Position of Charted Object		Diamond with crosshair centred at reported position. (Shown with chart symbol. Chart symbol not required for radar.)
AIS Based AtoN Virtual position		Diamond with crosshair centred at reported position.



Contours from Corps Survey

Line Placed for e-AtoN movement



E-AtoN Placed at 12’ along line with changing gage

9’ Contour from Corps Survey

Future possibilities…

- Chart/AtoN discrepancy reporting via AIS
- Expanded AIS coverage (non-lock locations
- Access to AIS data
  - USACE and USCG
  - USCG web services (data and validation)

E-Navigation implementation issues

- Equipment standards
  - Many still in development
- Carriage requirements
  - AIS
  - ECS
- Not everyone will have & know how to use…
  - Procedures
  - Training

CD-RTCM 12160.0

RTCM STANDARD
FOR
CREATION AND QUALIFICATION
OF
APPLICATION-SPECIFIC MESSAGES

1 Scope

This Standard specifies the minimum requirements for the development of RTCM Application-Specific Messages (RTCM ASM) and the methods of qualifying them for transmission via the Automatic Identification System (AIS) or via a Very High Frequency – Frequency Modulated (VHF-FM) Digital Email Message Service (VSDMS). An RTCM AIS ASM conforms to ITU-R M.1371, including its data structure and transmission on the AIS VDL (i.e., AIS 1 and AIS 2). An RTCM VSDMS ASM conforms to RTCM 12301, and may be transmitted either in ITU-R M.1371 or ITU-R M.1842 format on channels other than the AIS VDL.

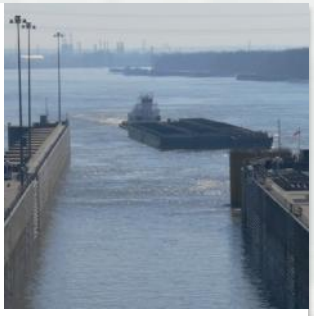
ASM should be developed using standard processes/procedures. This Standard provides guidance on the development of new ASM and a means to qualify them. It may be used by national authorities in determining which ASM to allow for use in their jurisdictions.

2 References

2.1 Provisions

The following documents contain provisions which, through reference, constitute provisions of this Standard. For these undated references, the latest edition/revision in effect when this Standard is published, including any amendments in effect when this Standard is published, applies.

Thank you for your attention!



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