



SOUTHEAST ARIZONA CITIZENS FORUM

Jan. 12, 2012

Status of the Nogales Wash, Flooding Concerns, Planning Concerns
Nogales, Arizona

UNITED STATES
INTERNATIONAL BOUNDARY AND WATER
COMMISSION

Don Atwood - Civil Engineer, Engineering Services Division
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John Light - Area Operations Manager

Presentation Topics

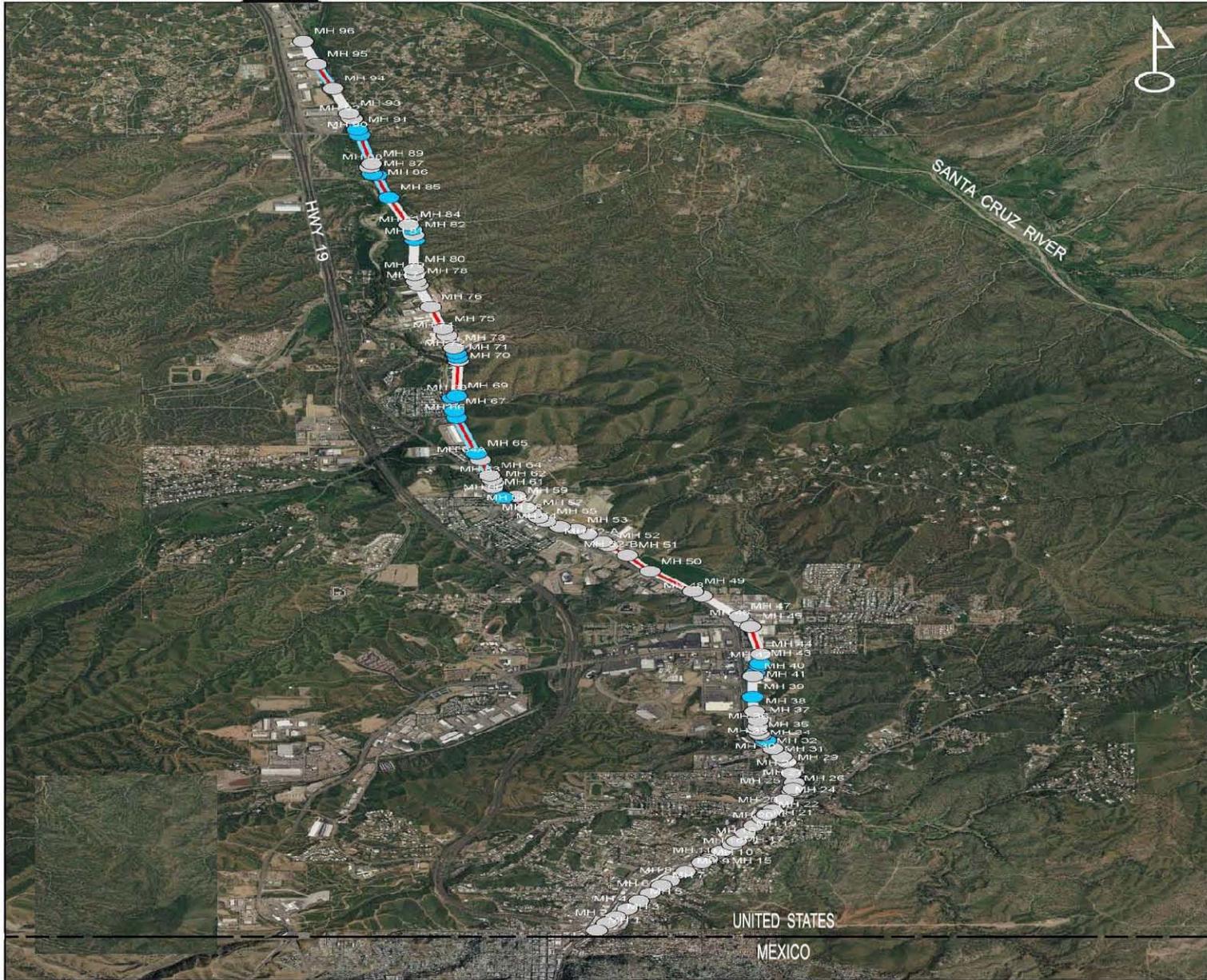
- Update on current events involving International Outfall Interceptor (IOI)
- Description of the Nogales Wash, flooding and erosion concerns, and sedimentation
- Detention basins constructed in Mexico to reduce peak flows in the US
- Historical Ownership and Maintenance of the IOI and Wash
- Past flooding events
- Condition of the wash within the US
- USGS Study with recommendations
- USIBWC's past, present, future plans
- Emergencies
- Open discussion and questions



Nogales and Rio Rico, Arizona

International Outfall Interceptor

NIWTP



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 *Compromised locations are approximate

A copy of the presentation from October 13, 2011, Citizens Forum is available for more information on the IOI

- The IOI is actively eroding and deteriorating.
 - The original structural strength of the pipeline has been compromised and the rate of deterioration is unknown.
- The remaining life of the pipeline can only be estimated.
 - Reliability of this system is only as good as its weakest link.



Current Events Involving IOI

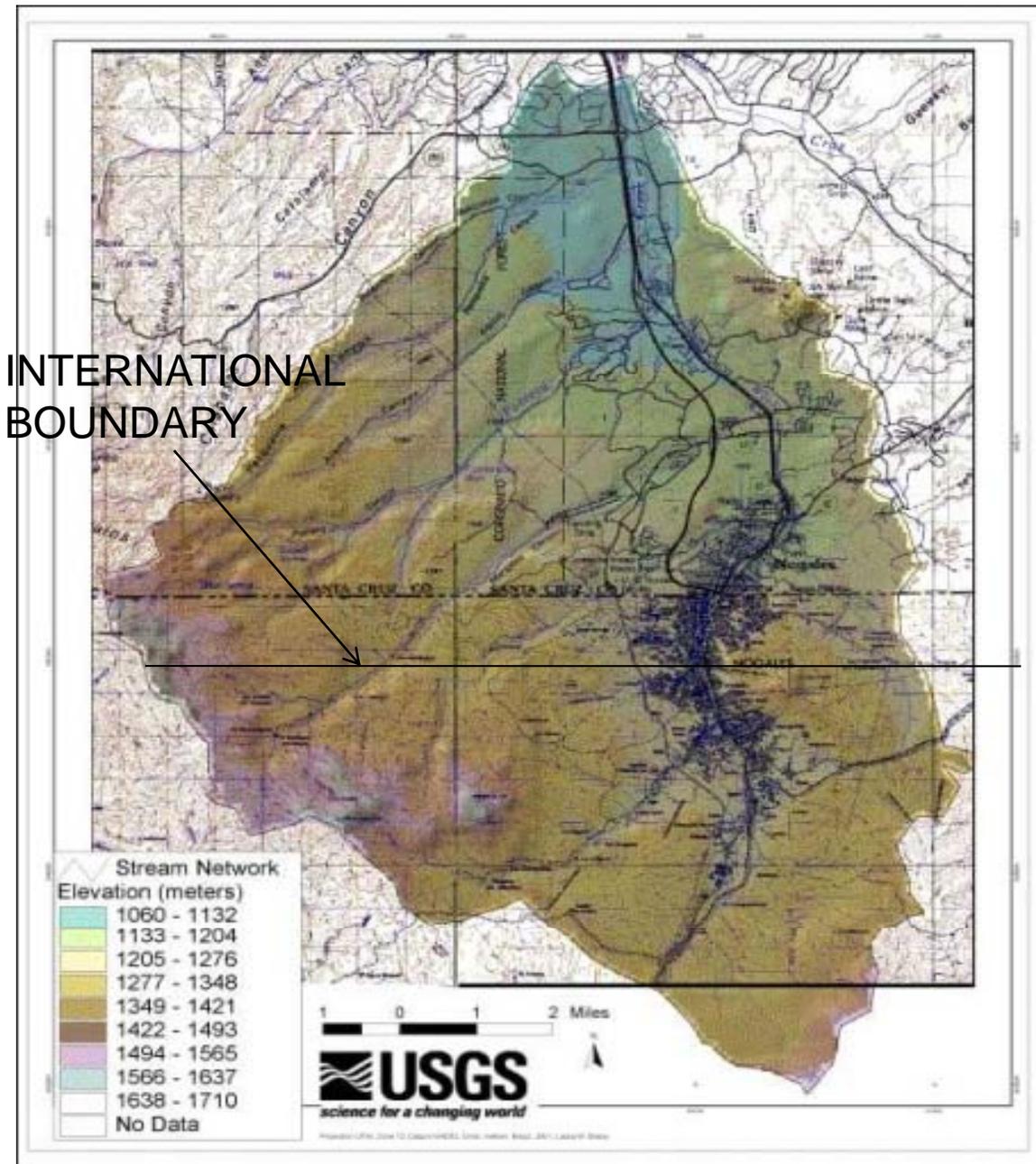
- August of 2011 received proposals for the Rehabilitation design of the IOI
 - Waiting on funding agreements between the City of Nogales and USIBWC
- Rehabilitation (Approximately 30 million dollars)
 - Slip Lining
 - Cured-In-Place Pipe (CIPP) – resin filled polyester tube is inserted into pipe and inflated with water or steam and cured-in-place
- Replacement (Approximately 100 million dollars)
 - Open Cut Complete replacement of existing Pipe



Nogales Wash Basin

- Nogales Wash originates 7 miles south and cuts the basin horizontally in two, prior to comingling with the Santa Cruz River 9 miles north of the border in Rio Rico, Arizona
- Basin is approx. half in U.S., half in Mexico (91 Sq. Miles)
- 17 arroyos flow into the Nogales Wash in Mexico
- Mexican portion of the basin has steep slopes, high velocity runoff, and severe sediment transport
- Population:
 - Nogales, Sonora – 350,000
 - Nogales, Arizona – 20,000





AREA:

91 mi² area

235 km² area

POPULATION:

350,000 Pop.

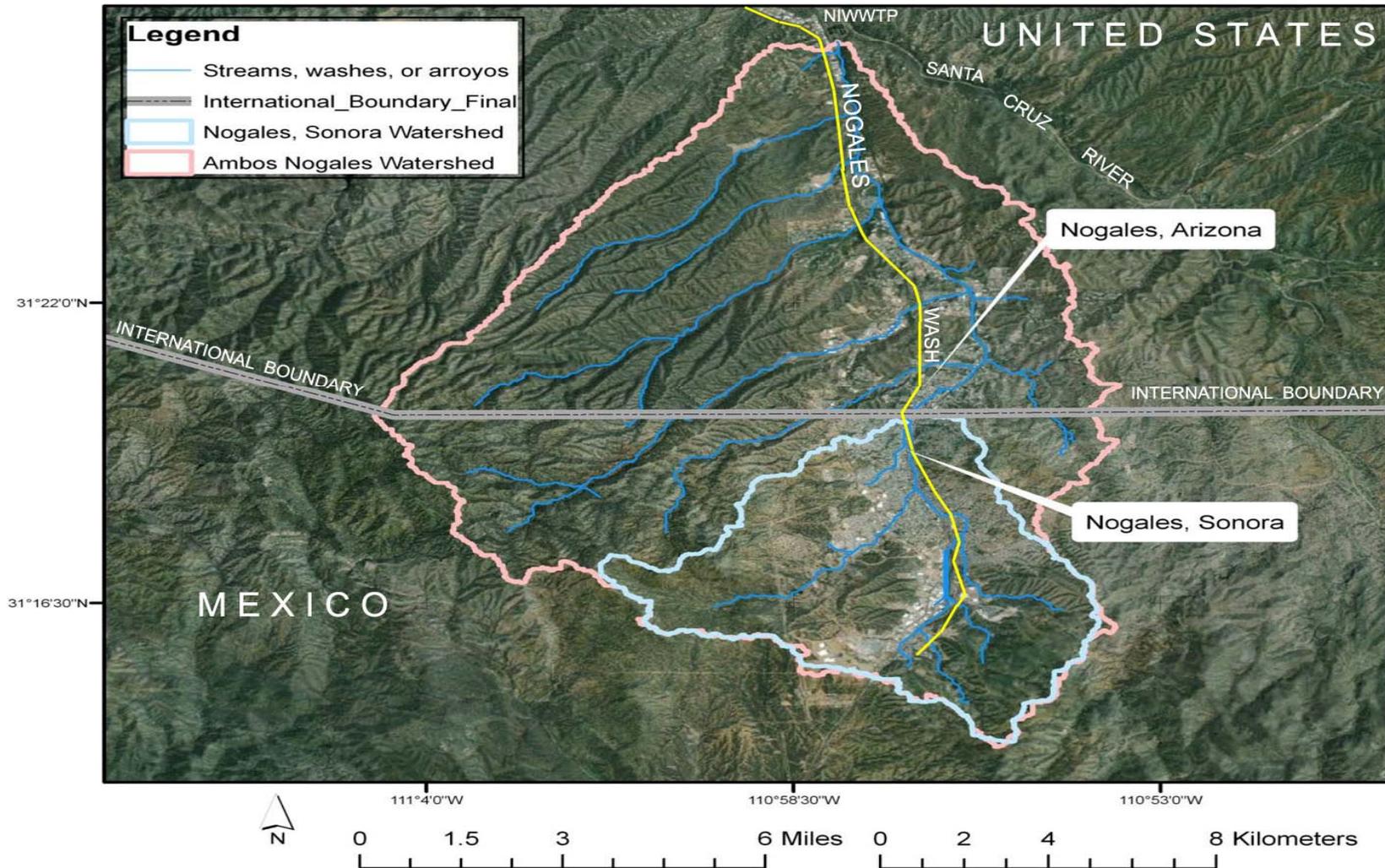
Nogales, Sonora

20,000 Pop.

Nogales, Arizona

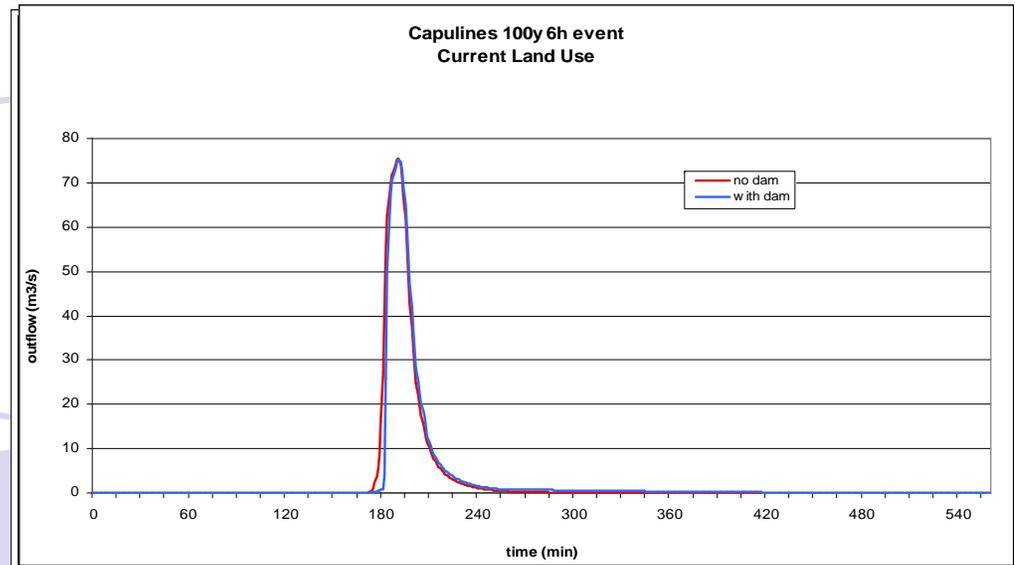
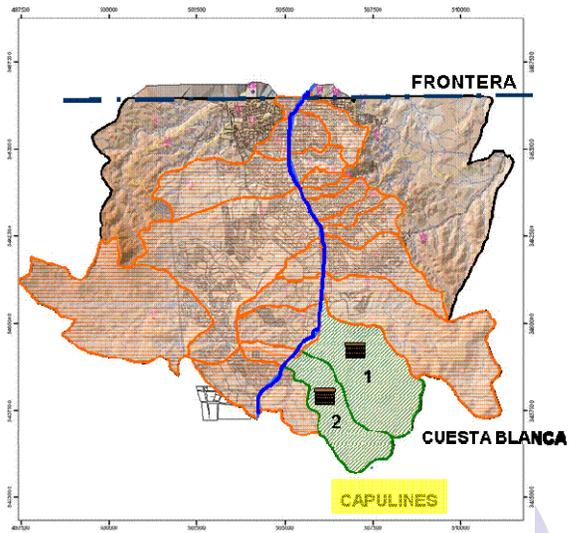


Nogales Wash Basin



An example of one of the five Stormwater Detention Features for Nogales, Sonora

Nogales, Sonora Wash



Erosion and Sediment Scour



Nogales, Sonora; Maintenance Issues as well as Opening of manholes for relief during heavy flows and for sediment removal

Sediment yield (kg), 25 year, 6 hour event		
Channel Impacts	Cuesta Blanca	Capulines
w/out feature	8,518,604	9,268,617
w/ feature	2,964,995	3,869,279
Difference	5,553,609	5,399,338



Nogales Flood Control Project

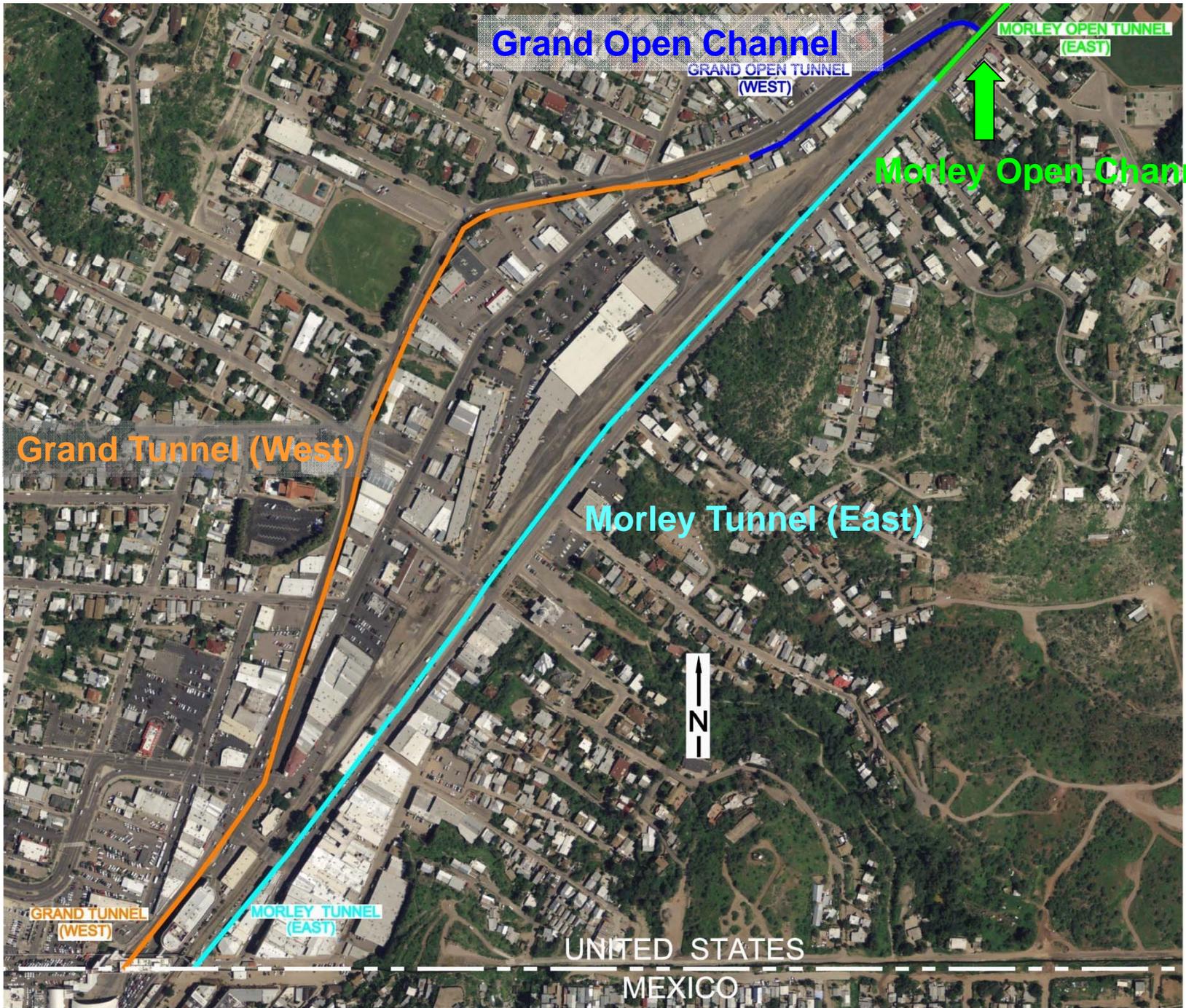
- Periodic flooding has affected Ambos Nogales for decades
- A major flood in 1930 prompted development of an international flood control project by the Commission
- Project consisted of an open channel in both countries and a covered channel near the border to convey stormwater flows through Nogales Wash, in the downtown areas
- Project constructed 1933-1936 and expanded in 1949
- City of Nogales, AZ, accepted responsibility for Operation & Maintenance in the U.S. in 1949



Historical Ownership and Maintenance

- Beginning with the passage of City of Nogales Resolution Nos. a-160 (1946) and A-210 (1949), the City relieved the USIBWC of all responsibility for the entire project, including construction, and maintenance of the IOI and Wash. While funding has shifted over the years from the U.S. to the City, and later in 1990 it morphed to a cost-sharing basis between the USIBWC and the City (with some construction and maintenance assistance rendered by the USACE and USIBWC), legal responsibility for the IOI and Wash has always remained with the City.





Grand Open Channel

GRAND OPEN TUNNEL
(WEST)

MORLEY OPEN TUNNEL
(EAST)

Morley Open Channel

Grand Tunnel (West)

Morley Tunnel (East)

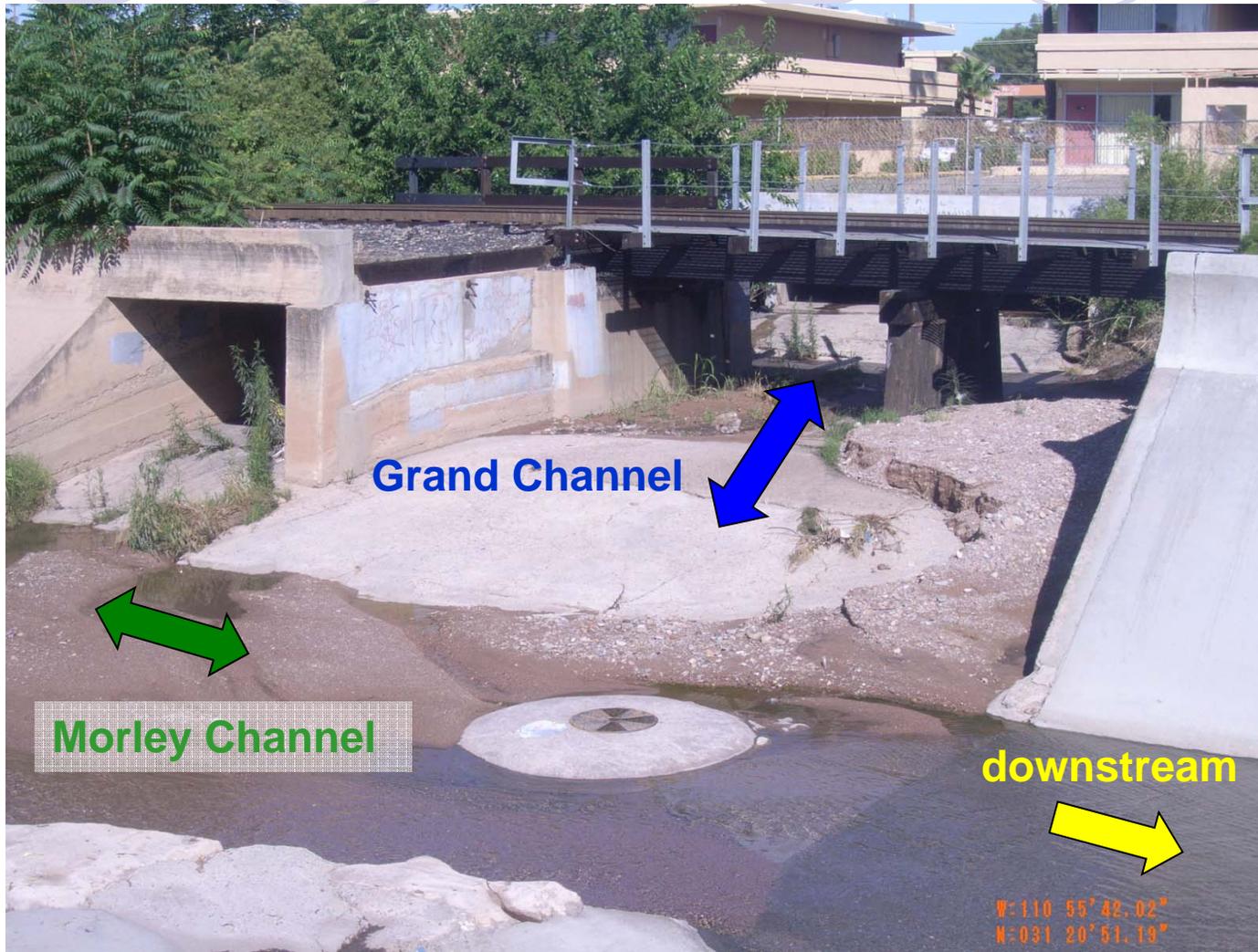


GRAND TUNNEL
(WEST)

MORLEY TUNNEL
(EAST)

UNITED STATES
MEXICO

Nogales Wash Facilities-Comingle Just Upstream of 82nd Bridge



Nogales Wash Facilities

- U.S. Facilities
 - Nogales Wash Tunnel or Morley Tunnel or East Tunnel, approx. 1 mile long
 - Grand Tunnel or West Tunnel, approx. 1 mile long
 - Concrete-lined trapezoidal open channel 1.1 mile
 - At the downstream end of the trapezoidal channel is an earthen channel affected by poor maintenance, trash, and debris
- Structural integrity of the tunnels and channels is at risk due to age, scour, and rebar exposure
- Earthen portion of Nogales wash in US is approximately 7 miles long



Underground Box Culvert Approx. 10' x 20' Looking South



In 2009 USIBWC and City of Nogales filled in voids within underground box culverts with concrete



Nogales Wash Facilities



Exposed rebar in tunnel ceiling

Nogales Wash Facilities



Smugglers Tunnel connecting to Grand Tunnel

Widespread concerns over possible foundation failure in and around the Dennis DeConcini POE

Concrete Trapezoidal Channel IOI is just beneath bottom slab



2007 Flood Damage



2007 Flood Damage



Repairs were undertaken in 2008.

2007 Flood



2008 Flood Damage

- July 12, 2008 Storm

- Major flooding in downtown Ambos Nogales
- Numerous businesses inundated
- Portion of the Nogales Wash tunnel in Mexico collapsed, exacerbating flooding
- Panels damaged in the open channel in the U.S.

- August 12, 2008 Storm

- Caused flooding similar to the preceding month
- No additional damage to the tunnel or wash



2008 Flood



2008 Flood



Tunnel collapse in Mexico

Nogales Flood Detention Study by Dr. Laura Norman with USGS

● ABSTRACT:

- The Nogales wash is being studied to prevent future flood disasters using detention facilities in Nogales, Sonora to reduce flood flows in the US
- The primary means of regulating this runoff is a series of detention features in Nogales, Sonora
- Currently there are five (5) new detention basins in Mx
 - ❖ Capulines
 - ❖ Cuesta Blanca
 - ❖ Bellotas Maquiladoras
 - ❖ Chimeneas
 - ❖ Bellotas Fraccionamiento



Nogales Flood Detention Study by Dr. Laura Norman with USGS (cont.)

- Detention Features:
 - Results of study depict a reduction in the peak flow for the 10-year, 1-hr event based on current land use and detention basins in the tributaries in Nogales, Sonora
 - Study provides results for twelve (12) detention features at final build out
 - Detention basins are designed to store runoff volume and discharge it slowly to reduce peak discharge downstream, reducing the associated flash flood hazards



Comprehensive Binational Stormwater Management Plan

- Potential system improvements identified by U.S.:
 - Clean washes and arroyos of sediment and debris
 - Cost-benefit analysis to prioritize construction of retention basins
 - Establish a protocol for emergency response and notification
 - Early warning system for high stormwater flows and sanitary sewer overflows, (SSO)
 - Provide more separation of sewage and stormwater
 - Separate Nogales Wash and the IOI or reinforce the IOI
 - Install system in Mexico to keep trash and debris from being transported into the U.S.



Comprehensive Binational Stormwater Management Plan

- Issues and concerns identified by Mexico:
 - Flooding, health and welfare
 - Funding assistance
 - Steep slopes quickly channel large volumes
 - Obstructions to free flow of stormwater
 - Settlements on federal lands and drainage channels
 - Arroyos used as streets
 - Border fence affects drainage at the border
 - Wall in the Grand Tunnel obstructs flow
 - Comingling of sewage and stormwater
 - Property for detention/retention basins



Comprehensive Binational Stormwater Management Plan

- Issues and concerns identified by U.S.:
 - Funding sources
 - Sanitary Sewer Overflows from Mexico contaminating Nogales Wash and Santa Cruz River
 - Morley and Grand Tunnel's structural integrity, exposed rebar within the tunnels
 - Damage in the trapezoidal channel during large flows
 - Erosion and sediment transport





Emergencies

- **Nogales Wash Emergency Response Plan (June 1, 2011) Updated yearly:**
 - Provides a comprehensive plan for all agencies to work together during an emergency
- **Arizona Department of Emergency Management (Chuck McHugh)**
 - ADEM- Mission is to coordinate emergency services and the efforts of governmental agencies to reduce the impact of disasters on persons and property.
- **Crisis Action Team (CAT)**
 - The plan will provide emergency contact information, logistical needs, personnel and equipment needs along with the coordination with the City of Nogales, ADEM, USACE, Santa Cruz County, ADEQ, CILA, CBP, and other stakeholders who will be involved with an emergency situation

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