Levee Safety Program

DOTD PUBLIC WORKS & WATER RESOURCES

Curt J. Boniol, P.E.
Levee Safety Program Engineer
Levee Safety

District Support

Inspections
  Assist Levee Districts with inspections, provide semi-annual reports

Permits
  Entered and approved at the District level (LONO’s)

Emergency Action Plans
  Help with annual updates

Training
  Provide training

Flood fight coordination
Levee Safety

Inspections

Federal - 33 CFR 208.10

Such inspections shall be made immediately prior to the beginning of the flood season; immediately following each major high water period, and otherwise at intervals not exceeding 90 days, and such intermediate times as may be necessary to insure the best possible care of the levee.

State - RS 38.2

A. The functions of the Department of Public Works shall comprise all of the administrative functions of the state in relation to the planning, design, survey and construction, operation, and maintenance and repair of public buildings used in connection with the operation of the department, and of levees, canals, dams, locks, spillways, reservoirs, drainage systems, irrigation systems, housing development, state planning, inland navigation projects, flood control and river improvement programs, public housing projects, and other public works.
Levee Safety

Inspections (cont’d)

State - RS 38.2
The department shall render all engineering, economic, and other advisory services within the scope of its functions to port and terminal districts and other local governmental subdivisions and special districts which its facilities allow, subject to the right to be reimbursed for the reasonable costs thereof.

RS 38.6
§6. Cooperation with drainage districts, levee boards, and political subdivisions, The Department of Transportation and Development may also cooperate with any drainage or subdrainage district, any gravity drainage or gravity sub-drainage district, any levee board, or any political subdivision, now or hereafter organized in accordance with law, upon any terms and conditions prescribed by the department. The department shall assess and collect fees for the engineering services it provides to drainage districts, levee boards, and political subdivisions, other than state or federally funded projects.

Levee Safety

Inspections (cont’d)

PL 84-99

Preparedness planning activities allow the Corps of Engineers to take the necessary steps to maintain a knowledgeable and experienced work force that is available for responding to natural and man-made disasters. These planning activities include writing plans, developing training, participating in exercises, maintaining adequate response supplies, and execution of an inspection program for flood damage reduction structures in the rehabilitation program.

The Corps of Engineers is authorized to provide emergency assistance for flood response, under Public Law 84-99. During a flood event, emergency assistance can be requested from the Corps by the State, to supplement state and local efforts. Assistance can be in the form of technical assistance or direct assistance, and will be used to project life and improved property such as critical infrastructure, residential areas, and public facilities. Advanced measures may be used prior to flooding or flood fighting activities to protect against loss of life or infrastructure.

Following a flood event a levee sponsor can request recovery assistance for a project that is currently eligible in the Corps’ rehabilitation program. Damage must exceed items of normal project maintenance and must have a repair cost of more than $15,000.
DOTD District Map

Levee Safety responsibilities in:
- District 04
- District 05 (58)
- District 08 (03)
Levee Safety

Inspection Tools

Tablets

- Customizable by Inspection
- Customizable by Observation Type
- Web Storage (non-DOTD) on Terra-Go Server
- Centralized Data management

Inspections

- Provide Recommendations/Options for Corrective Actions
- Provide Semi-Annual Inspection Reports
- Assist Levee Districts with the Quarterly Inspections
Levee Safety

Inspection Items Identified

• Drainage Structures, Pipes, Floodwalls, Levee Embankments, etc.
• Drainage Structure Condition and Functionality
• Slope Stability Issues
• Seepage Issues
• Animal Damage
• Encroachments (debris, buried utilities, overhead utilities, vegetation, fences, etc.)
• Settlement / Depressions / Cracking / Bank Caving
• Erosion /Rutting / Sod Cover

The levee systems are inspected quarterly to ensure that ongoing maintenance of the levees is not impeded and that the levee system will function as designed in the event of an emergency.
Levee Safety

Drainage Structure Functionality
Levee Safety

Slope Stability Encroachments
Levee Safety

Unwanted Vegetation Encroachments
Levee Safety

Utility Encroachments
Levee Safety

Erosion Encroachments
Levee Safety

Semi-Annual Reporting

Fully implemented, reporting through a Web or GIS interface. Reports are standardized and generated for delivery to Levee Districts. HQ Provides Semi-Annual Inspection Reports and Assist Levee Districts with Quarterly Inspections.

1,078 miles of federal levees (inspected quarterly)
77 miles of non-federal levees (inspected yearly)

Reports are a joint effort between HQ and district staff.
Levee Safety

Report Data is sorted by inspection point showing:

- Station number with type of observation
- Location of the problem
- Comments & recommended actions
- Pictures showing the observation
- Rating
Levee Safety

Report Data is sorted in the Appendix shows:

- Each observation starting with the beginning station through the ending station (length of inspection)
- Location of the problem
- Beginning & ending station at each inspection point showing a line

<table>
<thead>
<tr>
<th>Observation</th>
<th>Station</th>
<th>Rating</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>0+00</td>
<td>N/A</td>
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<tr>
<td>0+00</td>
<td>10+75</td>
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<td>LE.0000000.01 - Utility Poles Parallel Levee</td>
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<td>10+50</td>
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<td>LE.0000150.01 - Fence Crossing Levee</td>
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<td>42+75</td>
<td>40+50</td>
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<td>Unacceptable</td>
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<tr>
<td>100+75</td>
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<td>LE.0006975.01 - Buried Utility Crossing</td>
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<td>LE.0019650.02 - Fence Crossing Levee</td>
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<td>Cross Fence</td>
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<td>LE.0053375.01 - Fence Crossing Levee</td>
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<td>607+75</td>
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<td>637+75</td>
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</tbody>
</table>
Levee Safety

Report Data is sorted by observation type shows:

- All observations starting with the beginning station through the ending station
- Location of the problem
- Beginning & ending station

### Unwanted Vegetation

<table>
<thead>
<tr>
<th>Beginning Station</th>
<th>Ending Station</th>
<th>Position</th>
<th>Rating</th>
<th>Observation</th>
</tr>
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<tr>
<td>0760+00</td>
<td>707+00</td>
<td>Flood Side</td>
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<td>LE.0067660.01 - Fence Parallels Levee</td>
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<td>1211+00</td>
<td>1215+00</td>
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<td>LE.0127660.01 - Unwanted Vegetation</td>
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<td>1276+75</td>
<td>1283+75</td>
<td>Protected Side</td>
<td>Minimally Acceptable</td>
<td>LE.0127676.01 - Unwanted Vegetation</td>
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<td>1317+50</td>
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<td>Protected Side</td>
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<td>LE.0131750.02 - Unwanted Vegetation</td>
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<td>1396+00</td>
<td>1402+00</td>
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<td>LE.0139600.01 - Unwanted Vegetation</td>
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<td>2588+25</td>
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<td>Protected Side</td>
<td>Minimally Acceptable</td>
<td>LE.0258825.01 - Unwanted Vegetation</td>
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<td>2570+25</td>
<td>2580+00</td>
<td>Flood Side</td>
<td>Minimally Acceptable</td>
<td>LE.0257025.01 - Unwanted Vegetation</td>
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<td>3020+00</td>
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<td>Protected Side</td>
<td>Minimally Acceptable</td>
<td>LE.0302000.01 - Unwanted Vegetation</td>
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<td>3070+00</td>
<td>3072+25</td>
<td>Protected Side</td>
<td>Minimally Acceptable</td>
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<td>3077+00</td>
<td>3081+25</td>
<td>Protected Side</td>
<td>Minimally Acceptable</td>
<td>LE.0307700.01 - Unwanted Vegetation</td>
</tr>
</tbody>
</table>
Levee Safety

GIS Map page in the report shows:

• Observation type
• Observation station
• Geographical location with legend
Levee Safety

• Levee Permits
  • MS Access / SharePoint based system
  • Form driven input
  • Integrated with Email
  • Meets Record Retention Requirements
  • Approved locally within the Districts
  • Issue Letters of “No Objection”
Water Resources SharePoint Site

• Location [http://dotdport/engineering/pw_wr/private/default.aspx](http://dotdport/engineering/pw_wr/private/default.aspx)
• Central Location, accessible to all (with permission)
  • Data storage
  • Reports
  • Event data (flood photos, breach photos, etc.)
• Monthly Inspection schedules
Water Resources SharePoint Site
Levee Safety

Video Inspection

DOTD is investigating the purchase of a robotic camera. We will use this equipment for inspection of levee and dam drainage structures.
Levee Safety

Training
RS 38.301

“B. Except as provided in R.S. 38:330.2(I), the care and inspection of levees shall devolve on resident commissioners, assisted by such inspectors and watchmen as may be appointed pursuant to regulations, which the boards are hereby authorized to adopt. Each resident commissioner and any inspector or watchman who may be appointed shall attend once during his term of office an educational training program conducted by the Department of Transportation and Development.”

Training Outline
MODULE 1 Levees- Levee and Flood Control Works Inspection
MODULE 2 Floodwalls - Levee and Flood Control Works Inspection
MODULE 3 Drainage - Levee and Flood Control Works Inspection
MODULE 4 Pump Stations - Levee and Flood Control Works Inspection
Levee Safety

Emergency Action Plans (EAPs)

§319. Emergency procedures manual
Each board of commissioners of each levee district and levee and drainage district shall prepare a written procedures manual to be used during periods of emergency to facilitate the immediate and orderly actions of each board during an emergency. The manual shall initially be completed by December 1, 1985, and shall be submitted on or before that date to the office of public works, or its successor, and the Joint Legislative Committee on Transportation, Highways and Public Works for review. Thereafter, the manual shall be updated every two years and resubmitted for review.


• DOTD to develop a standard Emergency Action Plan format
• Working with DOTD District offices, keep the Emergency Action Plans current and useable
2016 Mississippi River Flood

Sector 1

Sector 2

Sector 3
2016 Mississippi River Flood
2016 Mississippi River Flood

Relief Wells
2016 Mississippi River Flood

Slope Failures
2016 Mississippi River Flood

Seepage
2016 Mississippi River Flood

Sand Boils
2016 Mississippi River Flood

Road Embankment Slide
QUESTIONS?

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225-379-3009
Dam Safety Program

Public Works and Water Resources

Edward M. Knight, P.E.
Dam Safety Engineer
Dam Safety Program

Program was created by Act 733 of the 1981 Regular Legislative Session (R.S. 38:21-28)

Chapter 21 (Intent):

• It is the responsibility of the state to provide a means for the inspection, regulation, and supervision of all present or future dams within the state and the operation and maintenance of those as specified in this Chapter, both federal and nonfederal but excluding the Toledo Bend Dam, in order to prevent and correct potential hazards to downstream life and property in the event of failure of any dam.
Chapter 22 (Definitions)

For the purposes of this Chapter, a dam is any artificial barrier which impounds or diverts water or any other liquid substance

• 25 feet or more in height, and has a capacity greater than 15 acre-ft. at maximum storage

OR

• 6 feet or more in height, and has a capacity of 50 acre-ft. or more at maximum storage
Dam Safety Program

Figure 1 - Structures that are required to have an approved permit under the State Dam Safety Program.

- - In State Dam Safety Program
- - Not in State Dam Safety Program
Figure 2 - Structures that must be submitted to the Director, Public Works and Flood Control Directorate for review under the State Dam Safety Program.

- Structures above the shaded area must submit preapplication.
- Structures below the shaded area do not require preapplication.
Dam Safety Program

Chapter 23 (Permit or consent required)
Chapter 24 (Rules and Regulations)
Chapter 25 (Exemptions for other programs)
Chapter 26 (Violations; orders of the Chief; remedial measures; emergency situations; designated operation and maintenance)
Chapter 27 (Damage Claims)
Chapter 28 (Penalties)

- It is unlawful for any person to violate any provision of this Chapter relative to dams, or any provision of the orders, rules, regulations, or lawful requirements of the chief engineer; or to willfully obstruct, hinder, or prevent the chief engineer, or his authorized representative, from performing the duties imposed herein;
- misdemeanor and shall be fined not more than five hundred dollars or be imprisoned for not more than six months, or both
496 Regulated Dams
(February 10, 2016)

- 42 High Impact
- 61 Significant Impact
- 393 Low Impact

Vernon Lake Dam – Vernon Parish
Dam Safety Minimum Standards

For:
- Design
- Construction
- Modification
- Maintenance & Operation

Ivan Lake Dam – Bossier Parish
Operation & Maintenance

• Acoustic Surveys
• Underwater Inspections
• Operation of Gates
• Emergency Action Plans

Grand Bayou Reservoir – Red River Parish
DOTD-maintained State Dams

Most of the 20 DOTD-maintained State dams are over 50 years old, some in need of several repairs.

**Good News:**
Thanks to State Capital Outlay funds Bayou D’Arbonne Lake spillway has had multiple repairs done and added safety features. The new Auxiliary Spillway (Tainter Gates Project) has also been completed.

- 286 LF of Buttress leaks
- 826 LF Apron Joints
- Gate Repairs
- Warning Signs
- Security Fencing and Gates
Bayou Dechene New Development

- 286 LF of Buttress leaks
- 826 LF Apron Joints
- Gate Repairs
- Warning Signs
- Security Fencing and Gates
Bayou Dechene New Development
Bayou Dechene New Development

- Top of Dam Elevation: 105’
- Normal Pool Stage: 90’
- Length of Dam: 2,600’
- Surface Area at Normal Pool: 1,090 Ac
- Designed to pass a PMP Event
Dam Inspection Procedural Sequence

• High Hazard Dams are Inspected Annually
• Significant Hazard Dams are Inspected Every 3 years
• Low Hazard Dams are Inspected Every 5 Years

• 150 to 175 Dams are Inspected Annually, including:
  
  1. Planning and Scheduling
  2. Pre-inspection Activities
  3. Field Inspection
  4. Post-Inspection Activities
Planning and Scheduling

- Sort dams to be inspected by geographical location and frequency of inspection.
- Determine what type of inspection is needed.
- Contact dam owners, stakeholders, and participants to coordinate inspection.
- Send out inspection notification letters.
Pre-Inspection Activities

- As-Built plan review, Emergency Action Plan review (EAP), Document review
- Review previous inspection reports
- Inspection Checklist & Form
- Aerial imagery review
Field Inspection

• Conduct a detailed visual field inspection of the Dam and the Reservoir

• Check spillway location using GPS

• Measure length of the embankment, spillway, etc.

• Identify dam safety deficiencies

• Collect additional information from the dam owner and others

• Collect information downstream of the dam for development of inundation maps & EAPs
Field Inspection
Field Inspection
Field Inspection
Field Inspection
Post-Inspection Activities and Report Preparation

- Prepare Inspection Report and document deficiencies
- Determine if immediate action is required
- Distribute the Report and deficiencies to the owner and other stakeholders
- Provide dam owners with informational/educational brochures and additional guidance as necessary
- Prepare breach analysis, Inundation map, EAP, and verify the Hazard Class
- Distribute the EAPs to owners and other stakeholders
- Follow-up with the owners on the required actions identified in the report and the deficiency letters
Consequences Of Dam Failure

- U.S. dam failures in the past 30 years

- over 135 fatalities and more than $2.6 billion in property damage

- The August 2013 Percy Quinn Lake Dam failure in Mississippi, and the March 2004 failure of the Big Bay Lake Dam near Hattiesburg, Mississippi are just two examples.

- The most recent is South Carolina.

- A total of 32 Dams Failed 6 High Hazard, 17 Significant Hazard

- None in LA, yet.
Consequences of Dam Failures
Big Bay Lake Dam, MS.
Low-Head Dam Hazards

Do you know what these are?
Low-Head Dam Hazards
Low-Head Dam Hazards

Island Farm Weir (Wright, Andrews and Kelly, 2003)
Low-Head Dam Hazards

- 68 percent either drowned (53%) or were injured (15%)
- Wearing a life vest improved the survival rate by a margin of 57% to 43%.
- 87 percent were male and 13 percent were female.
Dam Hazards
Questions?

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Statewide Flood Control Program

Billy Williamson, P.E.
Statewide Flood Control Program Engineer
Statewide Flood Control Program

Background

• Created by Act 351 of the 1982 Regular Session

• Primary goal is to reduce existing flood damages through an active, innovative approach that considers both structural and non-structural solutions

• Funded by Louisiana Transportation Trust Fund

• Project applications and funding amounts are approved by the Joint Transportation Committee
Statewide Flood Control Program

Program Features

• Competitive
  • Projects evaluated based on potential damage reduction versus State investment

• Cost-shared
  • Provides up to 90% of the construction cost for non-federal projects
  • Provides up to 70% of non-federal participants’ share of federal projects

• Uniquely structured to ensure:
  • Equitable distribution of funds statewide
  • All levels of local government from the biggest parishes and cities down to the smallest towns and villages can compete successfully
Statewide Flood Control Program

Project Requirements

• Must reduce existing flood damages
• Does not encourage additional development in flood prone areas
• Does not adversely affect upstream or downstream flooding
• Must have a construction cost of $100,000 or more
• Must be a stand-alone project
• Request assistance from DOTD to prepare the Application, if so desired. (Applies to Authorities representing less than 50,000 people)
Statewide Flood Control Program

Timeline

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<tr>
<th>APR</th>
<th>MAY</th>
<th>JUNE</th>
<th>JULY</th>
<th>AUG</th>
<th>SEPT</th>
<th>OCT</th>
<th>NOV</th>
<th>DEC</th>
<th>JAN</th>
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<td>Pre-Application Submission</td>
<td>Evaluation Committee Review</td>
<td>Application Preparation</td>
<td>Evaluation Committee Review</td>
<td>Public Hearings</td>
<td>Joint Legislative Committee Review</td>
<td>Appropriation of Funds</td>
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</table>
Statewide Flood Control Program
Pre-Application

- Non-technical description of the project
  - Documents existing flooding problem under existing conditions
  - Details the magnitude and frequency of the flooding problem
  - Lists possible solutions

- Sponsor must assume responsibility for its share of project costs
  - Right-of-Way Acquisition
  - Operation and Maintenance Costs
  - Local Match
Statewide Flood Control Program

Application

• Justifies the need for the project
• Investigates alternative solutions
• Selects cost-effective solution
• Provides Hydraulic Calculations with AND without the project
• Develops a detailed construction cost estimate
• Calculates program benefits
Statewide Flood Control Program
Evaluation Committee

Consists of:

• DOTD Public Works
• DOTD Districts
• Louisiana Geological Survey
• DOA State Planning Office
• CPRA
• NRCS

• Reviews the applications to determine which applications meet program requirements
• Scores each application that has met program requirements
Statewide Flood Control Program
Program Funding

Program funds are distributed on a two-tiered system:

• Urban Areas
  • Shreveport, Bossier City, Monroe, Alexandria, Lake Charles, Lafayette, Baton Rouge, New Orleans, and Jefferson Parish

• Rural Funding Districts
  • Northwest, Northeast, Southwest, South Central, and Southeast

• Rural Projects are separated into two classifications:
  • Rural-developed: Structural density of more than 128 structures per square mile
  • Rural-undeveloped: Structural density of 128 or less structures per square mile
Statewide Flood Control Program

Rural Funding Districts

• Northwest
  • Contains portions of St. Landry and Evangeline Parishes

• Northeast
  • Follows parish boundaries

• Southwest
  • Follows parish boundaries

• South Central
  • Contains portions of Iberville, Ascension, Assumption, and Lafourche Parishes

• Southeast
  • Contains portions of Iberville, Ascension, Assumption, and Lafourche Parishes
Statewide Flood Control Program

Funding Distribution

- 45% of annual program funds is allocated to projects within the nine urban areas
  - No more than 20% of the total amount available to urban projects may be allocated to a single urban area.

- 55% of annual program funds is allocated to projects in rural areas
  - Rural funding is allocated by district on a pro rata basis using total area and total flood plain area
  - Funding in each rural district is further allocated by undeveloped and developed area

<table>
<thead>
<tr>
<th>Rural Funding District</th>
<th>Percentage of Rural Funding</th>
<th>Percentage of District Funds</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Rural-Undeveloped</td>
</tr>
<tr>
<td>Northwest</td>
<td>23.1</td>
<td>52</td>
</tr>
<tr>
<td>Northeast</td>
<td>16.7</td>
<td>73</td>
</tr>
<tr>
<td>Southwest</td>
<td>15.5</td>
<td>55</td>
</tr>
<tr>
<td>South Central</td>
<td>22.6</td>
<td>42</td>
</tr>
<tr>
<td>Southeast</td>
<td>22.1</td>
<td>29</td>
</tr>
</tbody>
</table>
Statewide Flood Control Program

Funding Redistribution

- If approved projects in a particular rural category are insufficient to utilize the full allocation for that category, funding may be reallocated to projects in the other rural category within the same district.

- If approved projects in a funding district are insufficient to utilize the full allocation for that district, funding may be reallocated to the other rural funding districts on a pro rata basis based on percentages of rural funding.

- If funds allocated to the rural funding districts are remaining after all approved projects have been fully funded, remaining funds may be used to fund approved projects in urban areas. The opposite is also true.
Statewide Flood Control Program
Accomplishments

• 114 Projects Completed
  • 36 Additional Phases Completed

• 18 Project Phases Under Construction or Awaiting Closeout

• $236,706,099 Expended

• $2,496,209,509 in Flood Reduction Benefits

• 10.55 Benefits/Cost Ratio
Statewide Flood Control Program
Additional Information

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