# HURRICANE ANDREW

## STORM DAMAGE SURVEY

HAAG ENGINEERING CO.

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# HURRICANE ANDREW
# STORM SURVEY

Engineers and meteorologists at Haag Engineering Co. have conducted a damage survey covering southern Florida and southern Louisiana in the wake of Hurricane Andrew. Our purpose was two fold: (1) to document the wind velocities and water levels in the storm's path and (2) to evaluate the general performance of various constructed facilities.

Hurricane Andrew struck southern Florida on August 24, 1992, and entered southern Louisiana on August 26, 1992. Our storm survey team was dispatched to the affected areas on September 5 through 9, 1992. Both aerial and ground damage surveys were conducted in southern Florida, and meteorological information was obtained from the National Hurricane Center. The last two days of the survey were spent in southern Louisiana. Weather information for the state was obtained from the National Weather Service in Slidell, Louisiana.

## A. HURRICANE ANDREW CHRONOLOGY

Hurricane Andrew could be traced back to an easterly wave that developed near Lake Chad in North Africa during the second week in August, 1992. A tropical depression formed along the wave when it was about halfway between Africa and the easternmost islands of the Caribbean (11 degrees north, 38 degrees west) on August 17, 1992. Thunderstorms organized around the center of low pressure, and the storm strengthened to tropical storm status later that day. It was at that time the name "Andrew" was assigned to the storm.

Tropical Storm Andrew moved rapidly along a west/northwest course but fluctuated in strength over the next four days as it encountered bands of upper level wind shear. The storm exited this area and began gathering strength on August 21, 1992. At 5:00 AM, on August 22, 1992, the storm reached hurricane status; the winds increased rapidly as the central pressure dropped.

Hurricane Andrew moved steadily westward along 25.4 degrees north latitude during the next day. The lowest barometric pressure (27.23 in. or 922 mb) was recorded at 12:48 PM on August 23, 1992, when the center of the storm was positioned east of the Bahamas. The hurricane had reached the upper end of category 4 status on the Saffir-Simpson scale. Maximum flight level winds (10,000 ft.) were measured as high as 195 miles per hour or 170 knots.

Around 6:00 PM on August 23, 1992, the eye of Hurricane Andrew passed the northern end of Eleuthra Island in the Bahamas. A surface reporting station recorded a maximum wind gust of 120 mph as the eye wall passed. The height of this wind instrument above the ground is unknown at this time. Reconnaissance reports indicated the hurricane had a "double eye" structure for a few hours. Hurricane Andrew weakened slightly as it passed through the Bahamas, and the central pressure rose to 941 mb.

On the morning of August 24, 1992, Hurricane Andrew struck south Florida. The eye passed over Elliot Key located on the eastern side of Biscayne Bay. Fowey Rocks bouy, located east of Elliot Key, reported northerly winds sustained at 141 mph (123 knots) with a peak gust of 169 mph (147 knots) at 4:00 AM as the eye wall passed. Sea level pressure was 967 mb. Data transmission ceased after that time. The height of the wind instrument was 143 feet (43 meters) above sea level.

Around 4:30 AM, the eye of Hurricane Andrew was centered over Biscayne Bay. High storm surges had occurred from near Turkey Point to as far north as Miami. Seawater inundated numerous homes along the coast. Key Biscayne was submerged during the storm. The highest storm surge was over 16 feet NGVD (National Geodetic Vertical Datum) in Deering and Saga Bays. Many boats moored at Black Point and Coconut Grove marinas were damaged or destroyed.

Landfall of the eye occurred around 5:00 AM just east of Homestead Air Force Base. The eye was approximately 15 miles in diameter across and extended from SW 216th Street southward past Florida City. The northern end of the eye wall reached SW 88th Street. The National Hurricane Center, located in Coral Gables, Florida, was located on the northern edge of the eye wall. They reported a maximum sustained wind of 138 mph (120 knots) with a peak gust of 164 mph (143 knots) at 4:50 AM before the wind instrument was destroyed. The height of the wind equipment was approximately 200 feet above ground level.

Miami International Airport reported a maximum sustained wind of 86 mph (75 knots) with a peak gust of 115 mph (100 knots) from the east around 5:50 AM. The height of the wind equipment was approximately 33 feet (10 meters) above the ground.

It took about three hours for Hurricane Andrew to traverse southern Florida. Towns of Homestead, Naranja, Leisure City, Goulds, Princeton, Cutler Ridge, and Florida City were hardest hit. Moderate damage occurred in the communities of Perrine, Howard, and Kendall. Minor damage occurred north of 104th Street.

By 8:00 AM, the eye of Andrew was located over Big Lostman's Bay on the west coast of Florida in Everglades National Park. The storm had weakened to category 3 status, and the barometric pressure had risen to 29.91 in./951 mb.

When Hurricane Andrew entered the Gulf of Mexico, it re-intensified to category 4 status. However, the storm never recovered its pre-Florida landfall intensity. The lowest barometric pressure recorded while the storm was over the Gulf of Mexico was 27.52/936

mb at 4:00 PM on August 25, 1992. Approximately two hours later, Hurricane Andrew slowed and started to curve northwestward towards the south central Louisiana coast. Central barometric pressures continued to rise, and Hurricane Andrew gradually lost strength. The storm was downgraded to category 3 status prior to landfall on the Louisiana coast.

As Hurricane Andrew approached Louisiana, an isolated storm on one of Andrew's rain bands spawned a tornado that traveled west/northwestward through LaPlace, Louisiana. The tornado damage path was 9 miles long and up to 150 yards wide. The tornado was rated F3 on the Fujita damage scale. Damage to homes was more severe in the tornado than hurricane-caused damage to similarly constructed homes in Louisiana. The tornado lasted ten minutes beginning around 8:10 PM.

The eye of Hurricane Andrew skirted the coast along Vermillion Bay for several hours until curving northward and coming ashore near Burns Point, Louisiana, around 3:00 AM on August 26, 1992. Slow forward movement of the storm and close proximity of the eye wall over marshlands caused the hurricane to weaken; central pressures rose, and the hurricane was downgraded to category 2 status just after landfall. Rising pressures in the core of the storm led to lower wind speeds and storm surges inland in comparison to those experienced when the storm struck Florida. Consequently, the damage-causing potential of the storm was less in Louisiana, than in Florida. The eye of Hurricane Andrew eventually passed over Franklin, Louisiana just after sunrise. The towns of Morgan City, Berwick, and Patterson were located east of the eye and sustained the most severe wind damage. Only minor damage occurred in towns of Lafayette, Baton Rouge, and Houma.

The Morgan City Power Plant reported a maximum sustained wind of 92 mph (80 knots) with peak gust of 108 mph (94 knots) from the south at 3:05 AM. The height of the wind equipment was approximately 50 feet above the ground. The highest reported storm surge was 7 feet NGVD at the Marine Conservatory at Cocodrie, Louisiana.

Andrew continued northeastward and was downgraded to a tropical storm during the afternoon on August 26, 1992, when the center of circulation was between Baton Rouge and Lafayette.

The National Hurricane Center reported that Hurricane Andrew rated as the fifth strongest storm to strike the U.S. mainland and the most costly storm in history in terms of the amount of property damage. Several figures and tables are appended summarizing the meteorological data.

B. AERIAL DAMAGE SURVEY IN FLORIDA

An aerial damage survey was conducted on September 5, 1992, over southern Florida. The survey began at the Miami International Airport. We made several east/west traverses south of the Miami airport from Tamiami Airport to Coral Gables southward to Florida City. Cities of Coral Gables, Kendall, Howard, Perrine, Cutler Ridge, Naranja, Leisure City, Homestead, and Florida City were included within the aerial survey. Our final traverse extended from Key Largo northward to Key Biscayne.

We made the following general observations in our aerial survey:

1. Most of the damage to residences occurred south of an east/west line extending from Tamiami airport (SW 112th Street). The damage primarily involved loss of roof coverings that were tiles or composition shingles.

2. Concrete masonry residences and warehouses performed well. We saw few failures with these buildings. Damage to these structures ranged from F0 to F1 on the Fujita scale.

3. Mobile homes were destroyed, and several mobile home parks south of 104th street sustained severe damage. In contrast, adjacent conventional housing performed much better.

4. There were certain subdivisions which sustained more building damage than adjacent developments. These residences had wood-framed walls and roof structures. Some of the homes in the large developments sustained damage up to F3 on the Fujita scale. However, we do not believe wind velocities of F3 intensity caused this damage.

5. Severe damage occurred to large metal buildings. Many hangers at Tamiami airport and Homestead Air Force Base were destroyed. However, smaller metal buildings fared much better, especially if their large doors faced a direction opposite that of the oncoming wind.

6. Water towers remained intact in each community we visited. A few television and radio towers were downed by the storm.

7. Coconut Grove Marina and Black Point Marina sustained heavy damage, and many boats were cast adrift, foundered along shore, or were driven into the mangrove swamps.

8. Many trees were uprooted throughout the survey area. Trees fell to the west/southwest in the northern one-half of the survey area extending as far south as the Kendall and Cutler Ridge area. Trees fell to the north and northeast south of this area from Naranja through Florida City.

9. The greatest wind damage to residences and mobile homes was consistent with roof level (sustained) wind velocities between 120 and 130 mph in eye wall areas.

C. GROUND SURVEY IN FLORIDA

A ground damage survey was conducted throughout south Florida south of an east/west line extending through Tamiami airport. We assessed the performance of residential structures, metal buildings, concrete masonry buildings, and tilt-up concrete buildings. We paid close attention to details that involved fastening roof coverings, decking, roof trusses, and gable ends. The types of fasteners (nails or staples) and roof connections (metal straps or hurricane clips) were noted. A number of photographs are appended.

A transit and rod were used to obtain the heights of the storm surge along the coast. Debris lines and water marks in buildings were residual indicators of how high the storm surge was during the storm.

The following general observations were made in our ground survey:

C1. ROOFING

1. Many concrete tile roofs sustained severe damage as the tiles were not well secured to the roofs. Tiles installed on mortar patties over roll roofing performed poorly. Typically, failure initiated between the tile and the mortar patty or between the roll roofing and the deck. The result was numerous tile missiles which caused additional damage to buildings downwind.

   Tiles nailed to wooden battens also performed poorly. In many instances, the tiles were lifted over the fastener head leaving the nailed battens intact. In these instances, the fastener heads were smaller in diameter than nail holes in the tiles.

2. Lightweight three-tab composition shingle roofs sustained severe damage. Many homes were completely stripped of shingles. Shingle roofs that were stapled performed worse than roof shingles that were nailed. In many instances, the staples were installed incorrectly on the shingle with crowns oriented up and down (vertically) instead of along the width of the shingle (horizontally). Loss of the roof coverings allowed rainwater to breach the buildings causing further damage.

3. Built-up roofs over wood-fiber insulation board performed poorly, especially when fiber board insulation was adhered to the roof deck with asphalt. Failure initiated in the fiberboard just above the region where asphalt infiltrated the board. In some instances, little to no bond had developed between the asphalt and the fiber board.

4. Loose roof gravel became airborne projectiles and broke windows on several buildings downwind.

5. Heavy dimensional composition shingles performed better than tab-type shingles, especially when nailed.

6. Overall, plywood decking performed as well as chipboard decking. Both experienced more failures when they were stapled, instead of nailed, to the rafters.

7. Pre-manufactured wooden roof trusses had little to no lateral bracing and cascaded (like falling dominoes) when the roof decking was removed. This problem was evident even when metal straps were used to secure the ends of the trusses to the top plates.

8. Wood-framed gable ends and exterior walls were lightly nailed to other framing members. Numerous failures were noted when the nailed connections pulled loose.

C2. RESIDENCES

1. Concrete masonry dwellings greatly outperformed wooden buildings. However, some of these buildings shared the wooden roof truss problems discussed previously. Few masonry wall failures were found.

2. Windows that were taped did not fare as well as windows that were covered with plywood. Many windows were shattered by flying debris (roofing tiles). Some window

coverings were not secured well to their frames and were dislodged becoming airborne.

3. In general, mobile homes performed poorly. Many failures had initiated when the stapled connections between the walls and floors as well as the roof trusses and walls had pulled loose. We did not find metal plates between roof/wall and floor/wall connections. Exterior walls pivoted in the high winds becoming nearly horizontal, and the roof covering tore loose. Several mobile homes that were not tied down properly had rolled or flipped over on their sides.

C3. COMMERCIAL BUILDINGS

1. Many large span metal buildings had collapsed. Typically, the base plates on steel columns had been torn around the fasteners. Bay door failures were found on the windward sides of the buildings.

2. Several double-tee concrete roof beams had been cracked near mid-span, and some had fallen into various buildings. Failure initiated when wind forced the top of the cambered member upward placing tops of the beams in tension. Concrete tee failures were found in several strip shopping centers and warehouses.

3. A few tilt-up concrete buildings had collapsed when the roof along the windward wall was removed. As windward walls fell inward, the remaining walls fell outward.

D. GROUND SURVEY IN LOUISIANA

A ground damage survey was conducted throughout south central Louisiana extending south and west of a line from Grand Isle to Houma to Lafayette. We assessed the performance of residential structures, metal buildings, and wooden commercial facilities paying close attention to connection details. A number of photographs are appended.

A transit and rod were used to obtain the heights of the storm surge along the coast. Debris lines and water marks in buildings were residual indicators of how high the storm surge was during the storm.

The following observations were made from our ground survey:

1. Most of the damage to residences occurred in a line from Morgan City to Franklin to Cypremort Point. Conventional wood-framed structures survived with little or no damage except on Cypremort Point where damage up to F2 intensity was observed. Failure occurred when homes were impacted by flying debris (metal boat houses and tree limbs). Gable ends failed in several instances; otherwise, most of the damage was confined to various roof coverings.

2. Mobile homes performed poorly. Many failures had initiated when the stapled connections between the walls and floors as well as the roof trusses and walls had pulled loose. There were no metal straps between roof/wall and wall/floor members. Walls pivoted becoming horizontal as the roof covering tore loose. Mobile homes that were not tied down properly had rolled or flipped over on their sides.

3. Many trees were uprooted throughout the survey area. Trees fell to the south in the western one-half of the survey area west of Franklin. Trees east of Franklin fell mostly to the northwest.

4. Wind damage to residences and mobile homes was consistent with roof level wind velocities (sustained) less than 100 mph.

ACKNOWLEDGEMENTS

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- National Weather Service - Slidell, LA
- Robert Prentice, NWSFO - Des Moines, IA
- Steve Wachholder
- Randy Zipser

# HURRICANE ANDREW REPORT
## SUMMARY OF FIGURES AND TABLES

# Definition of Fujita Tornado Scale (F scale)

(F0) Gale tornado (40-72 mph): Light damage
Some damage to chimneys; break branches off trees; push over shallow-rooted trees; damage sign boards.

(F1) Moderate tornado (73-112 mph): Moderate damage
The lower limit (73 mph) is the beginning of hurricane wind speed; peel surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads.

(F2) Significant tornado (113-157 mph): Considerable damage
Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light-object missiles generated.

(F3) Severe tornado (158-206 mph): Severe damage
Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off ground and thrown.

(F4) Devastating tornado (207-260 mph): Devastating damage
Well-constructed houses leveled; structure with weak foundation blown off some distance; cars thrown and large missiles generated.

(F5) Incredible tornado (261-318 mph): Incredible damage
Strong frame houses lifted off foundations and carried considerable distance to disintegrate; automobile-sized missiles fly through the air in excess of 100 m; trees debarked; incredible phenomena will occur.

(F6-F12) (319 mph to Mach 1, the speed of sound): The maximum wind speeds of tornadoes are not expected to reach the F6 wind speeds.

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*(F0+F1) Weak Tornado*
*(F2+F3) Strong Tornado*
*(F4+F5) Violent Tornado*

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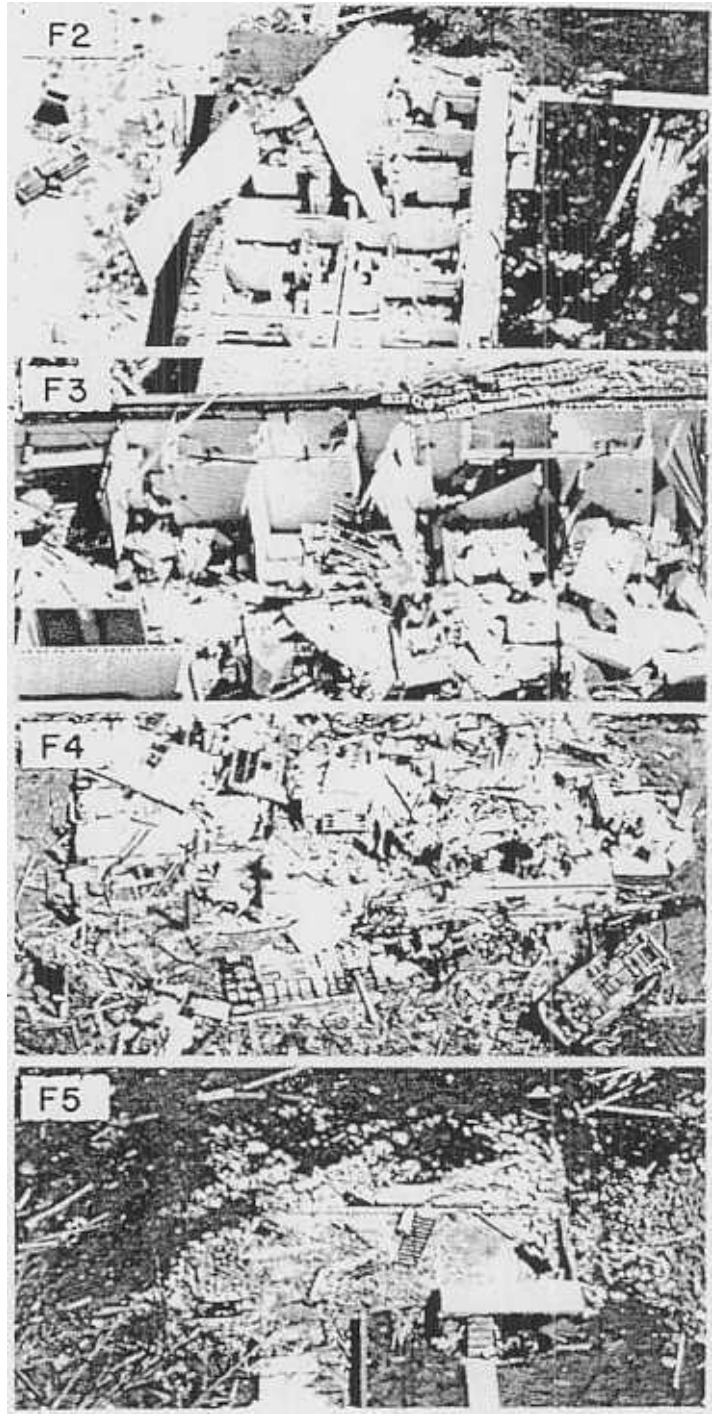
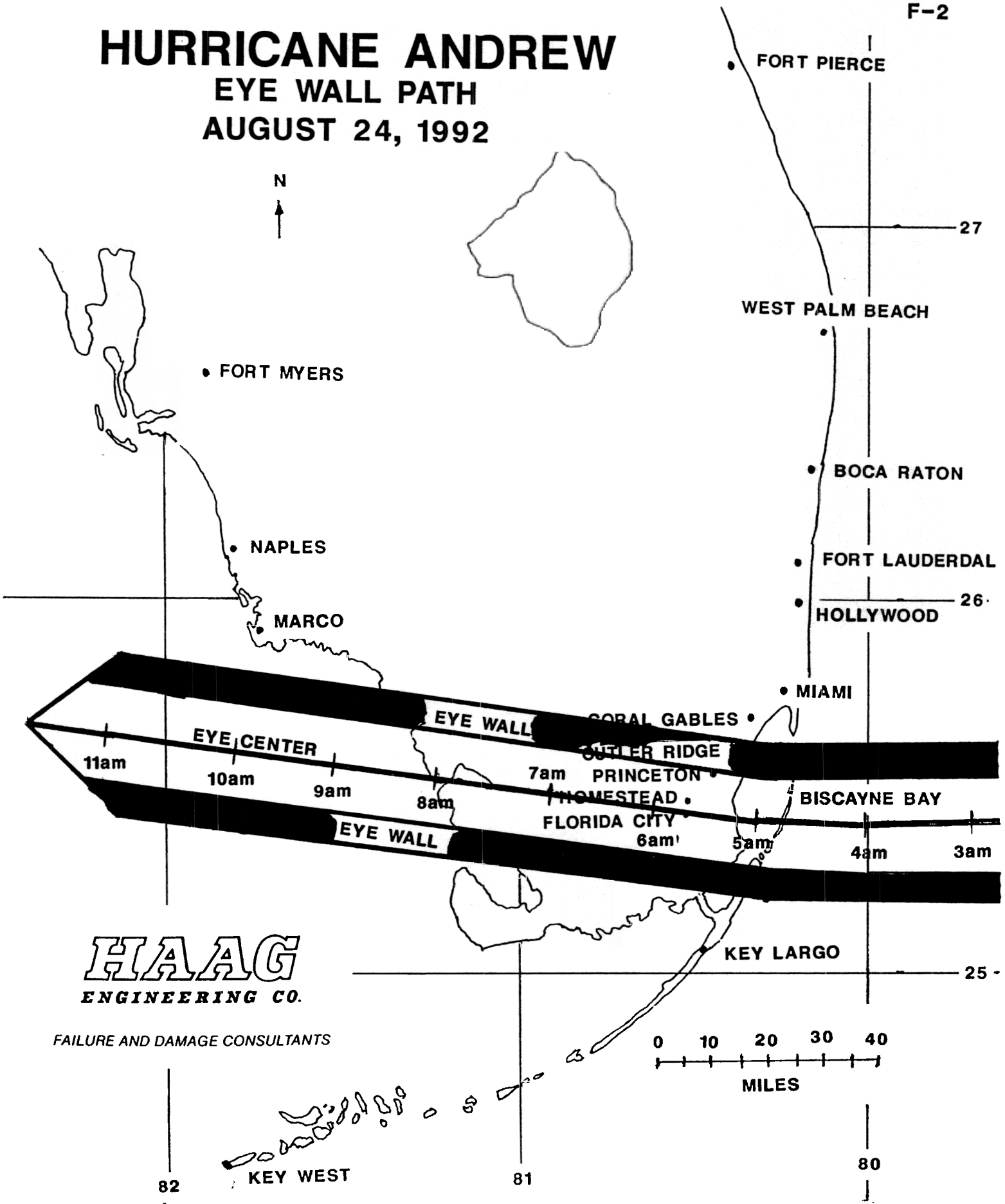
From J. Atmos. Sci., August 1981, p. 1517-1519




USCOMM-NOAA-ASHEVILLE, N.C. 1992-1700

F-2

# HURRICANE ANDREW
## EYE WALL PATH
## AUGUST 24, 1992

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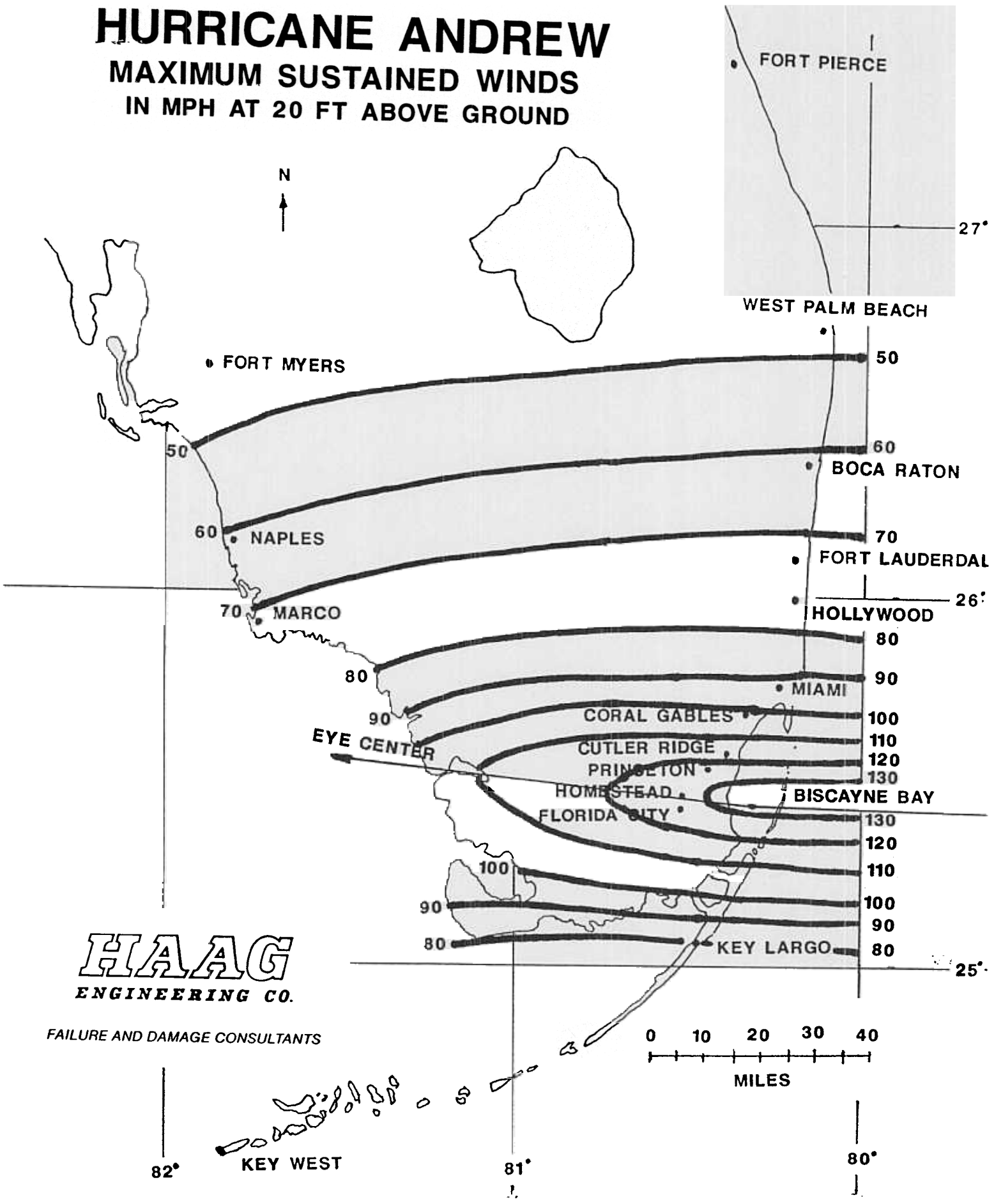
# HURRICANE ANDREW

## MAXIMUM SUSTAINED WINDS

### IN MPH AT 20 FT ABOVE GROUND

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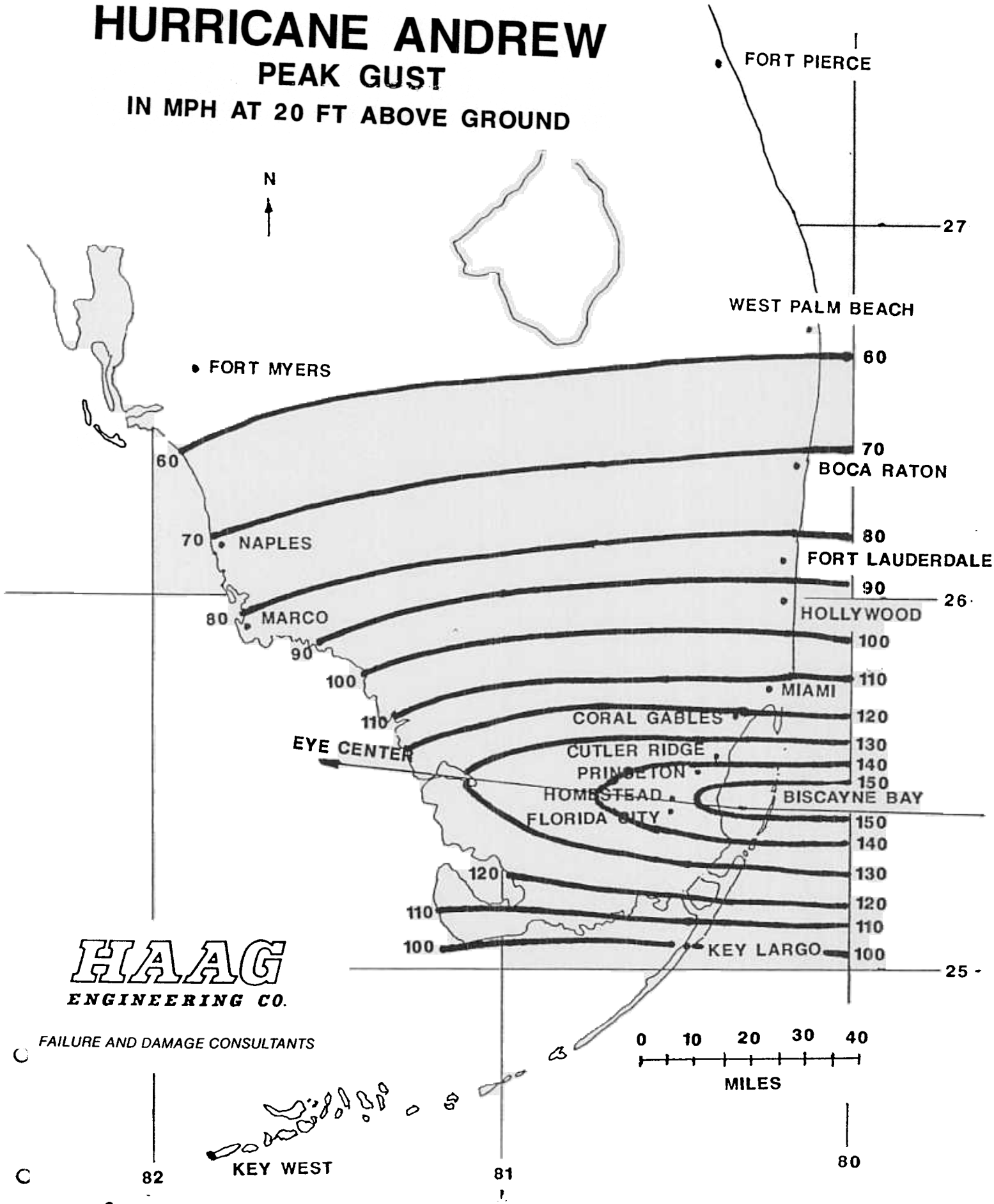
# HURRICANE ANDREW

## PEAK GUST

### IN MPH AT 20 FT ABOVE GROUND

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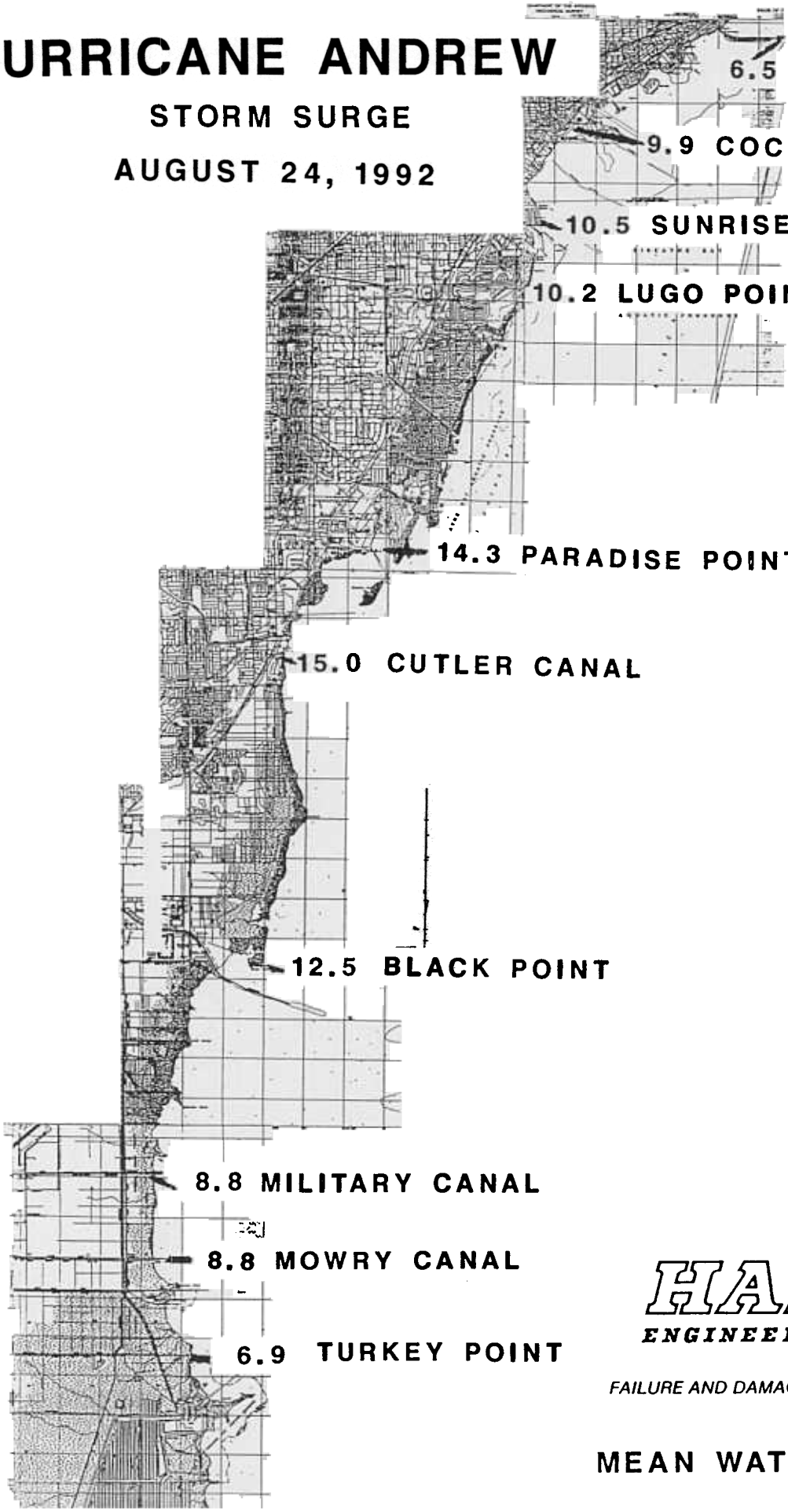
# HURRICANE ANDREW

## STORM SURGE

## AUGUST 24, 1992

F-5

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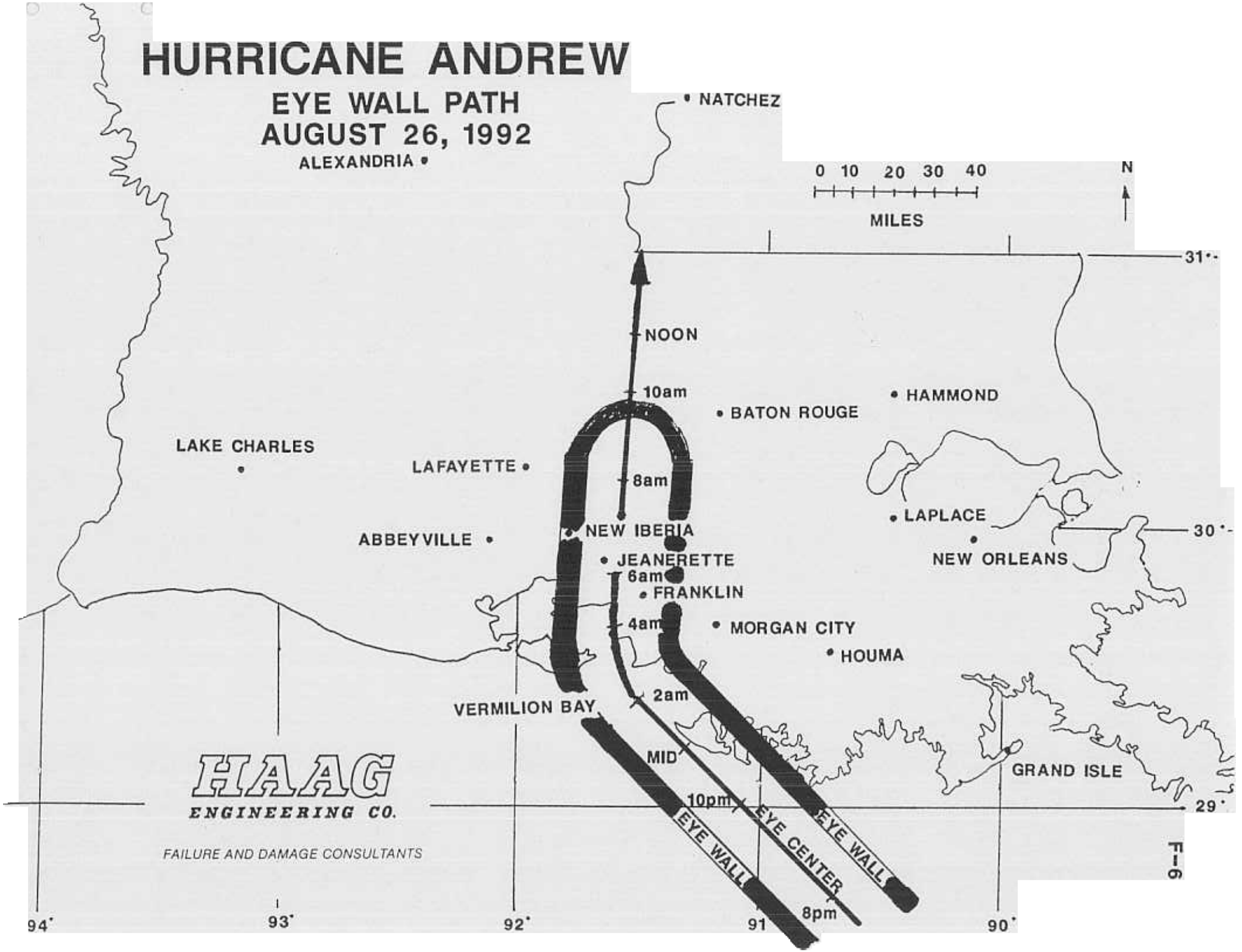
MEAN WATER LEVEL


HURRICANE ANDREW
EYE WALL PATH
AUGUST 26, 1992
ALEXANDRIA
NATCHEZ
0 10 20 30 40
MILES
N
31°
NOON
10am
8am
6am
4am
2am
MID
10pm
8pm
HAMMOND
BATON ROUGE
LAKE CHARLES
LAFAYETTE
ABBEYVILLE
NEW IBERIA
JEANERETTE
FRANKLIN
MORGAN CITY
HOUMA
LAPLACE
NEW ORLEANS
30°
VERMILION BAY
GRAND ISLE
29°
EYE WALL
EYE CENTER
EYE WALL
EYE WALL
HAAG
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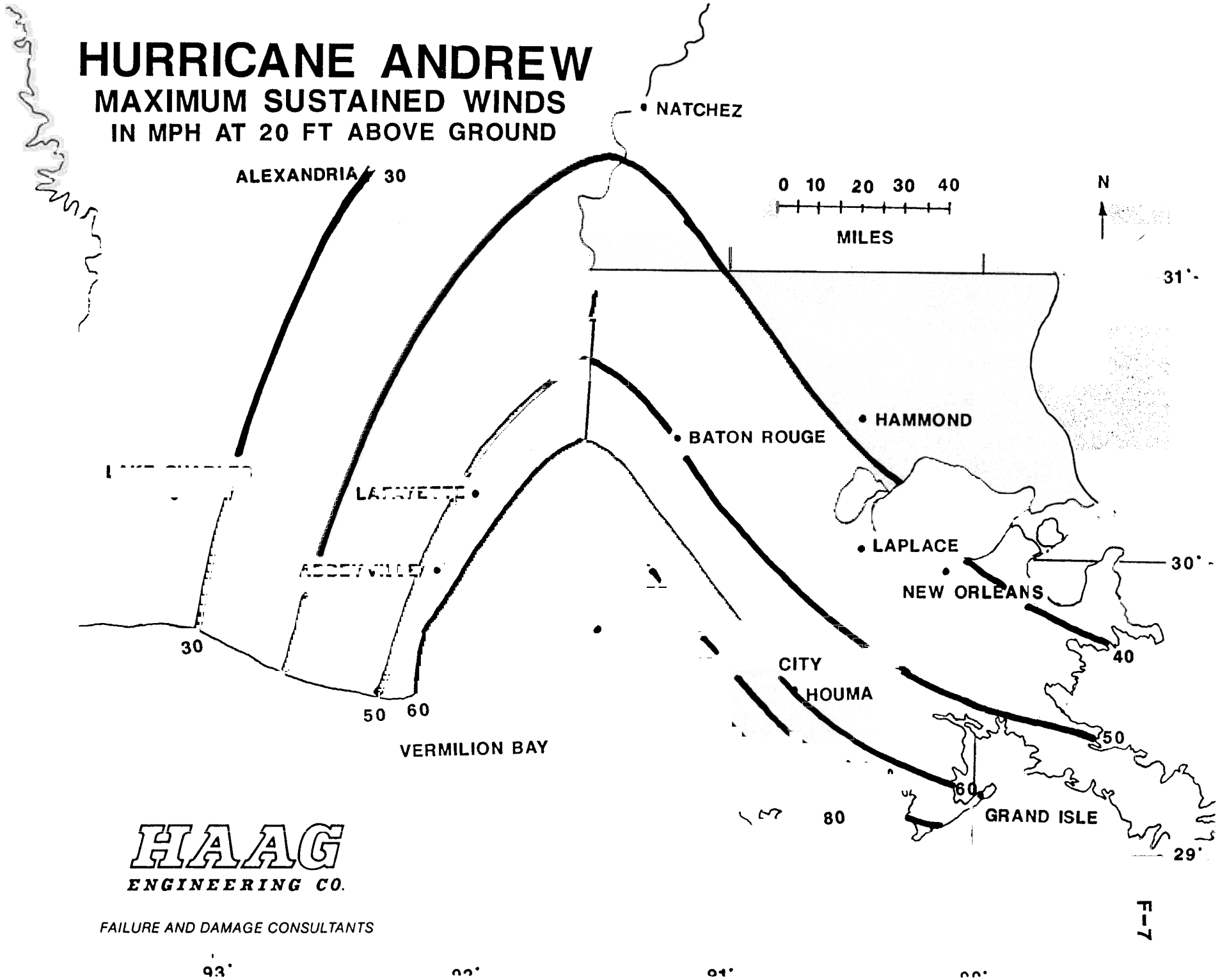
94°
93°
92°
91
90°
F-6

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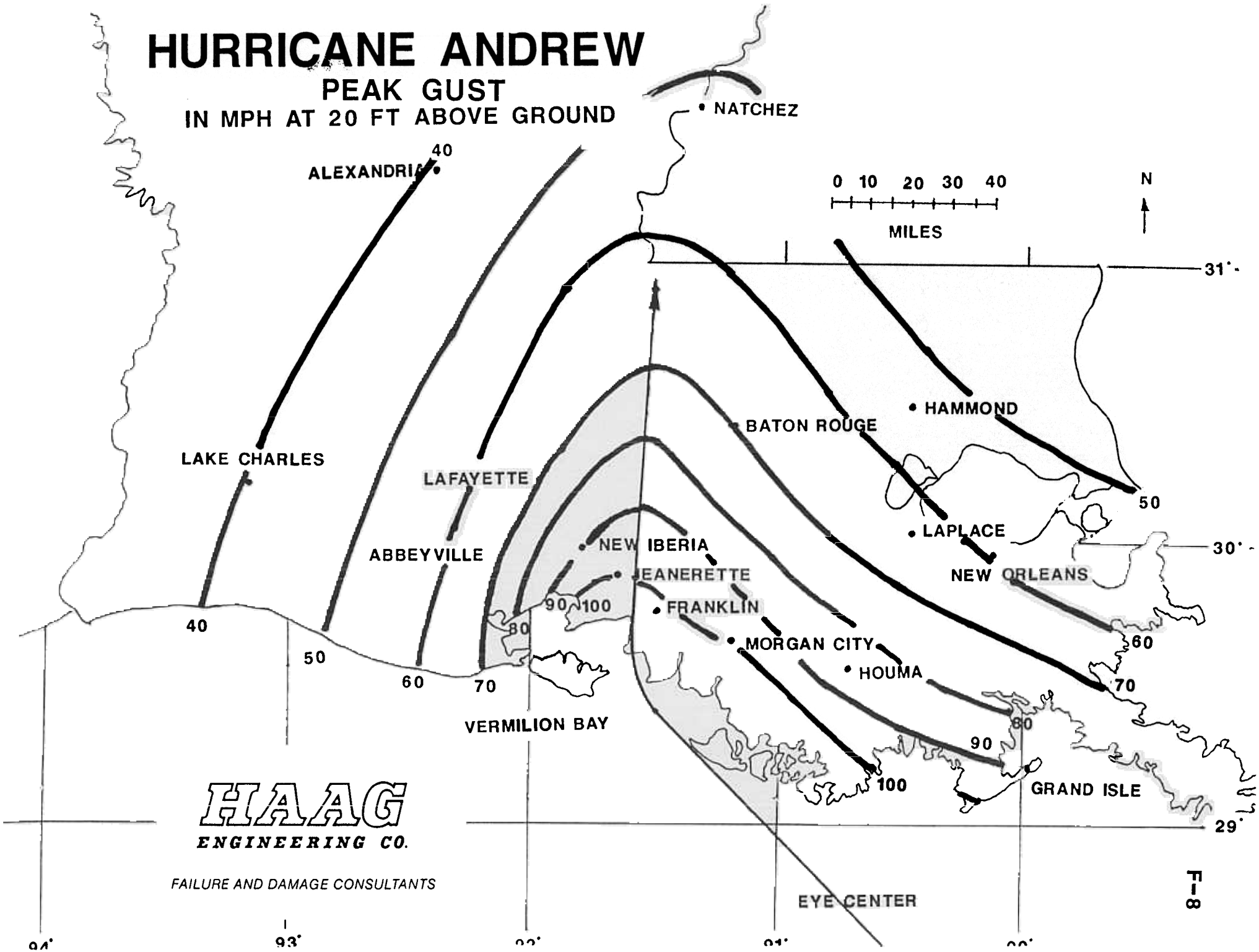
F-7


HURRICANE ANDREW
PEAK GUST
IN MPH AT 20 FT ABOVE GROUND
NATCHEZ
ALEXANDRIA
40
0 10 20 30 40
MILES
N
31°
LAKE CHARLES
LAFAYETTE
ABBEYVILLE
BATON ROUGE
HAMMOND
LAPLACE
NEW ORLEANS
50
30°
NEW IBERIA
JEANERETTE
FRANKLIN
MORGAN CITY
HOUMA
90
100
80
60
70
40
50
VERMILION BAY
GRAND ISLE
29°
EYE CENTER
94°
93°
91°
F18
HAAG
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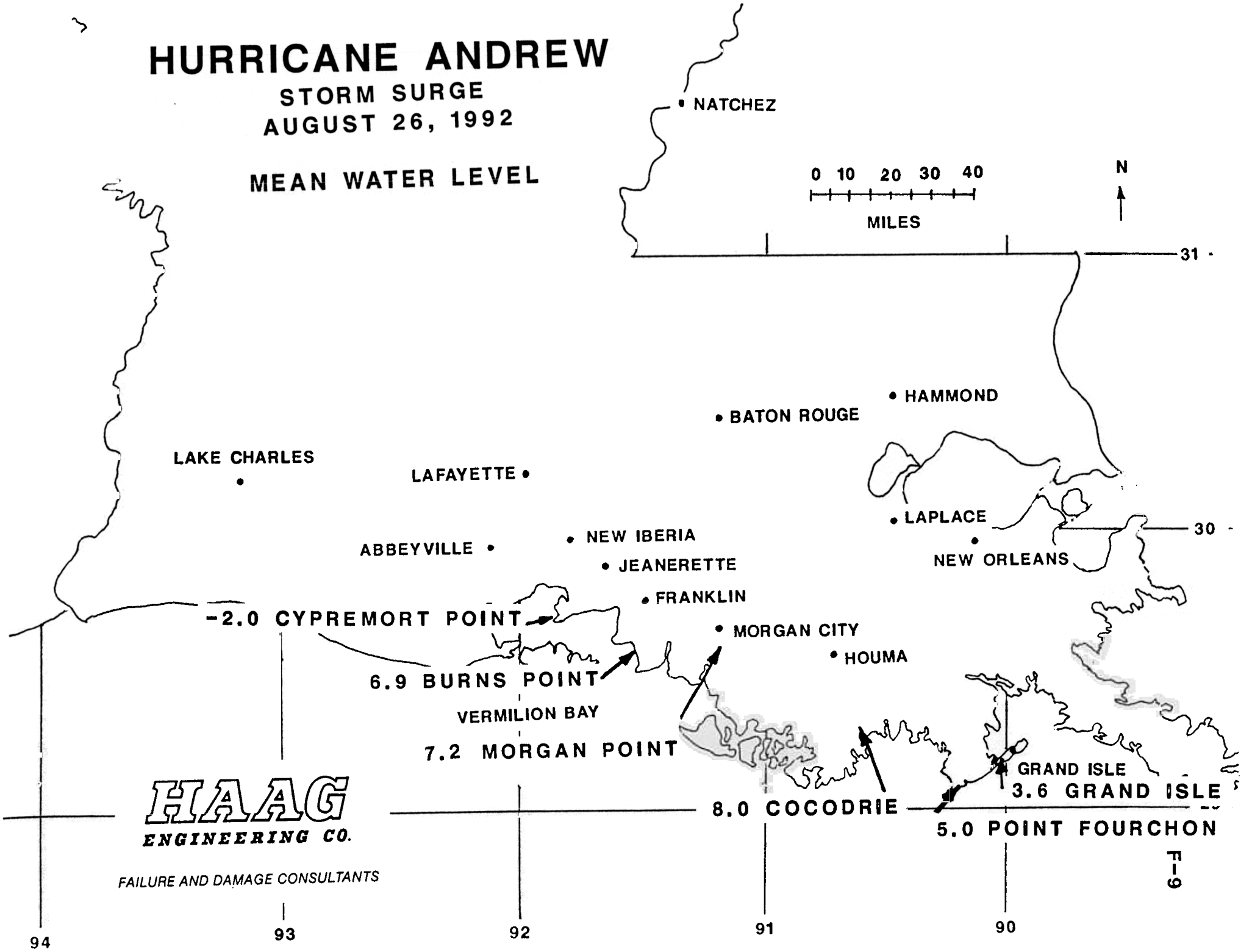
HURRICANE ANDREW
STORM SURGE
AUGUST 26, 1992
MEAN WATER LEVEL
NATCHEZ
0 10 20 30 40
MILES
N
31
HAMMOND
BATON ROUGE
LAKE CHARLES
LAFAYETTE
LAPLACE
30
NEW IBERIA
ABBEYVILLE
NEW ORLEANS
JEANERETTE
FRANKLIN
-2.0 CYPREMORT POINT
MORGAN CITY
HOUMA
6.9 BURNS POINT
VERMILION BAY
7.2 MORGAN POINT
GRAND ISLE
3.6 GRAND ISLE
8.0 COCODRIE
5.0 POINT FOURCHON
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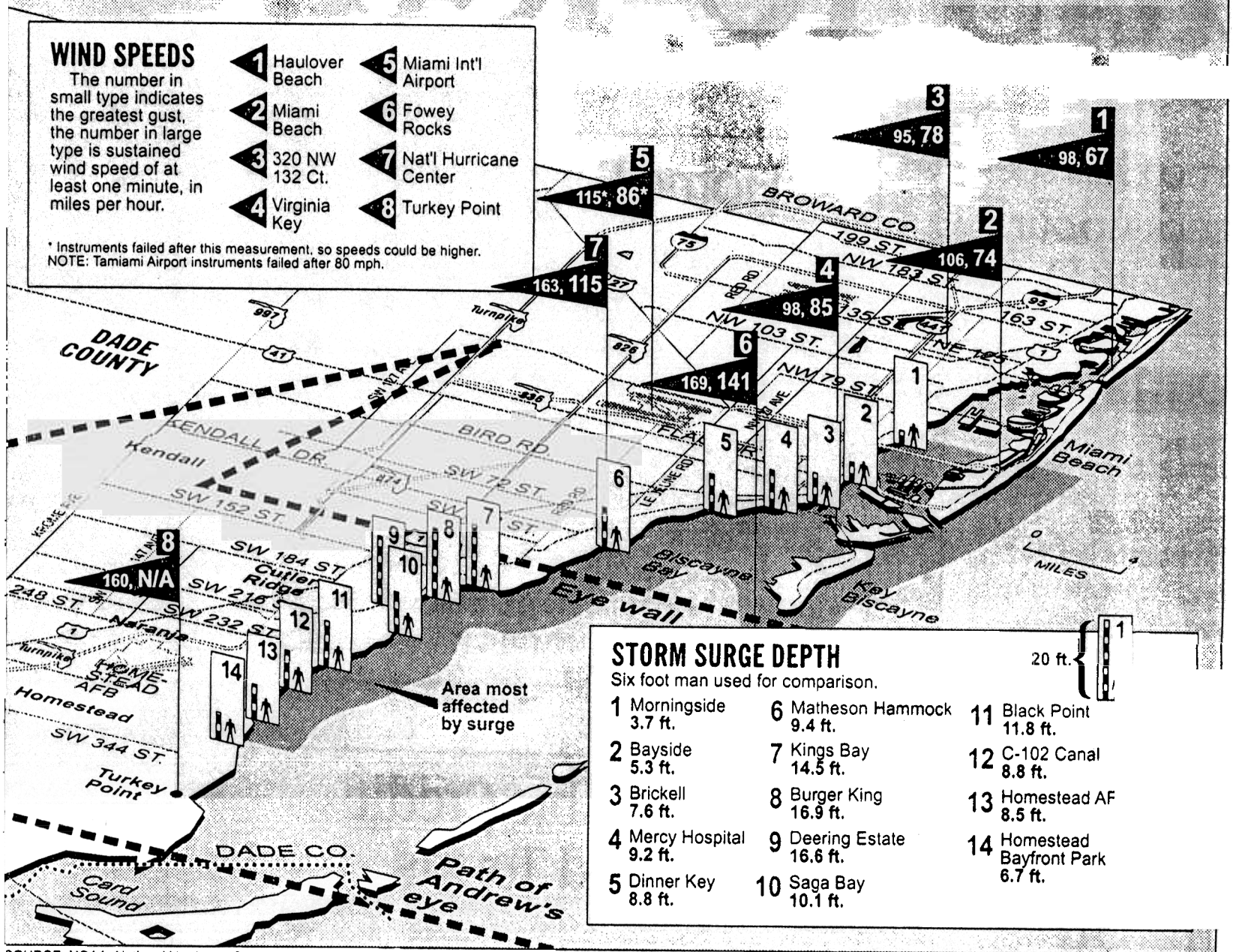
94
93
92
91
90
F1-9

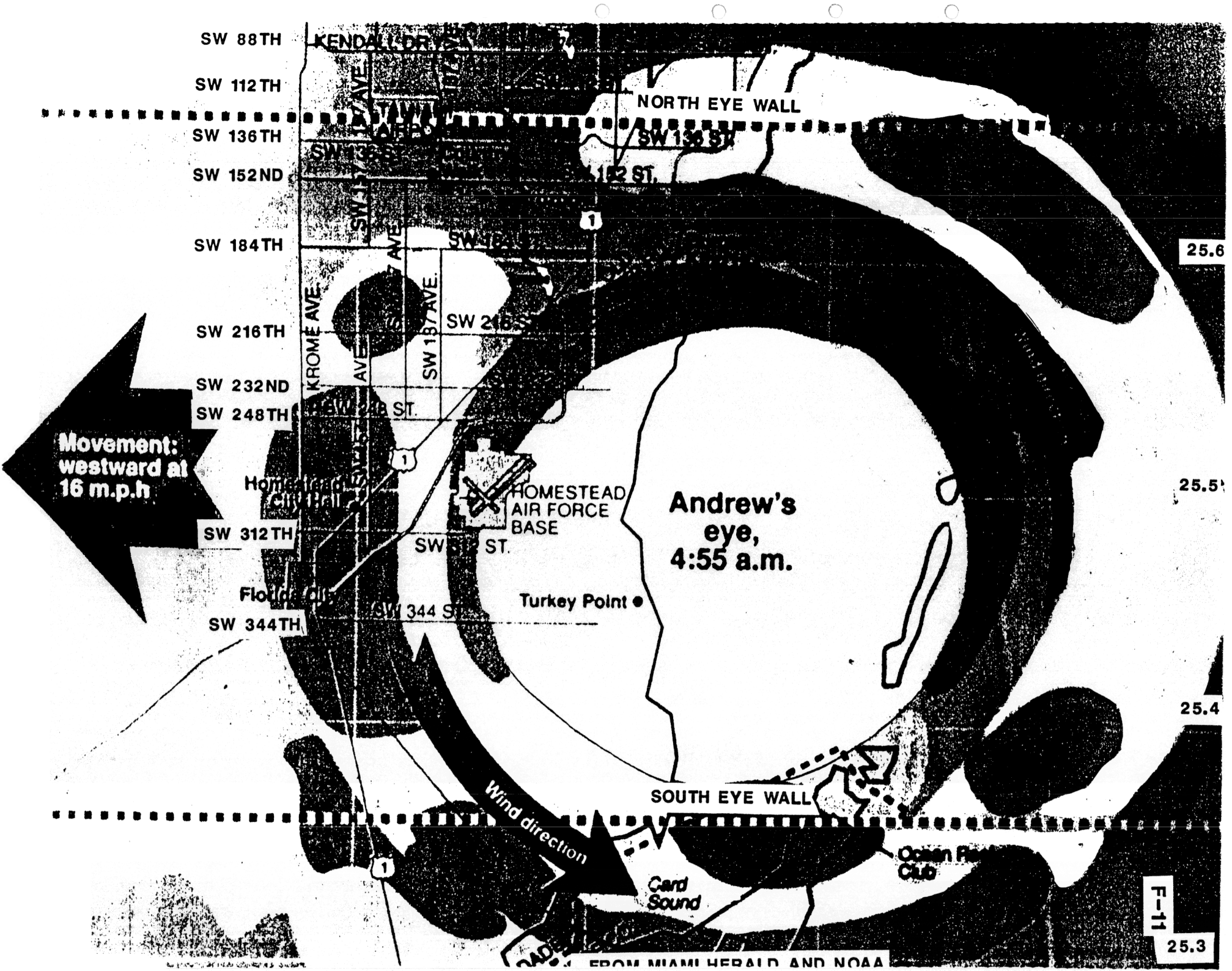
# SELECTED WIND SPEED AND STORM SURGE MEASUREMENTS

A preliminary report of Hurricane Andrew offers a glimpse into the statistics of Andrew's wind and water force. Wind measuring instruments were rendered inoperative in many places, making data unavailable.

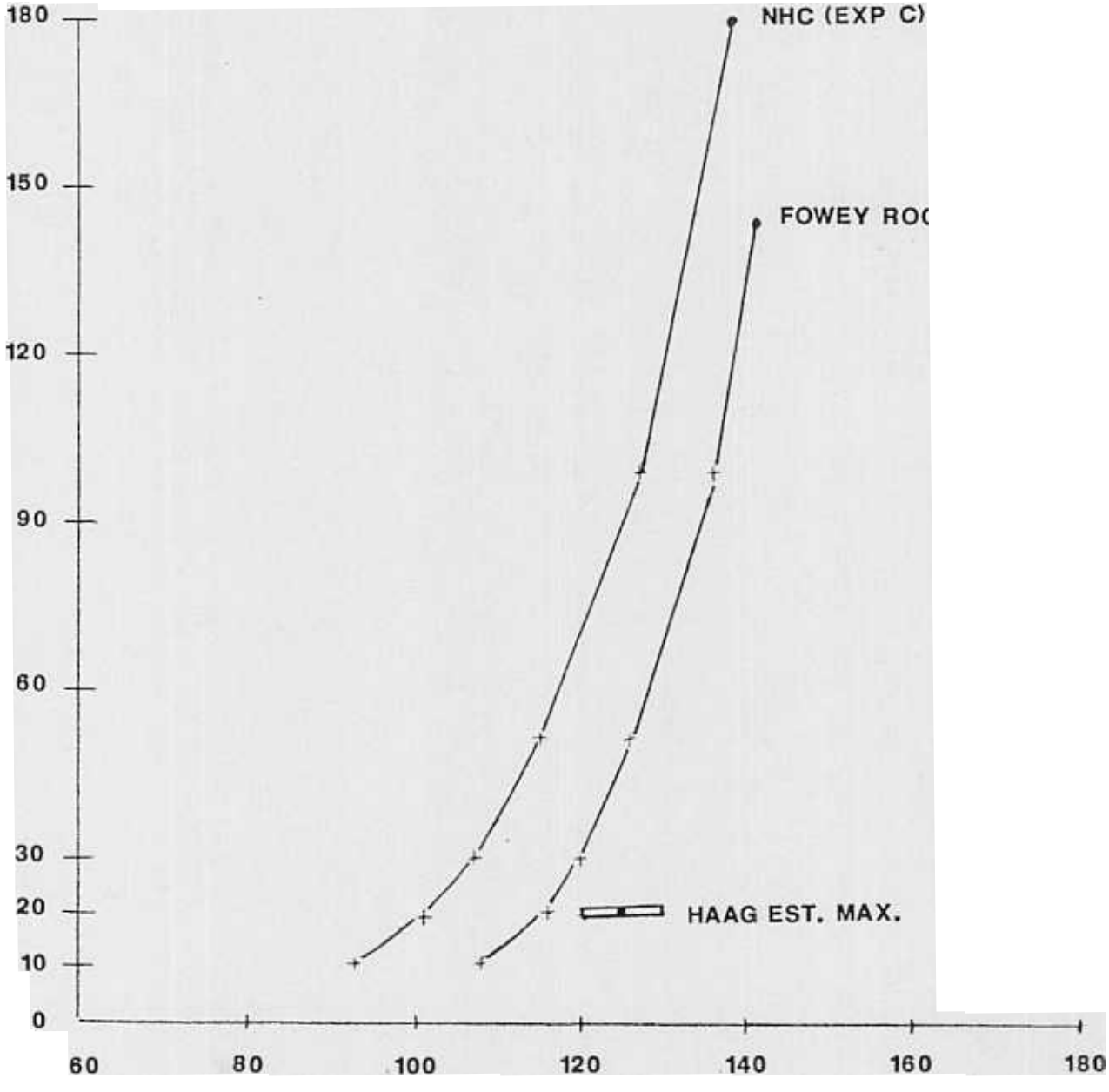



SOURCE: NOAA, National Hurricane Center

DAN CLIFFORD / Miami Herald Staff


SW 88TH
KENDALL DR.
SW 112TH
NORTH EYE WALL
SW 136TH
SW 152ND
SW 184TH
SW 216TH
SW 232ND
SW 248TH
KROME AVE.
SW 177 AVE.
SW 187 AVE.
Movement: westward at 16 m.p.h
Homestead City Hall
HOMESTEAD AIR FORCE BASE
Andrew's eye, 4:55 a.m.
SW 312TH
Florida City
SW 344TH
Turkey Point
SOUTH EYE WALL
Wind direction
Card Sound
Ocean Reef Club
25.6
25.5
25.4
25.3
F-11
FROM MIAMI HERALD AND NOAA

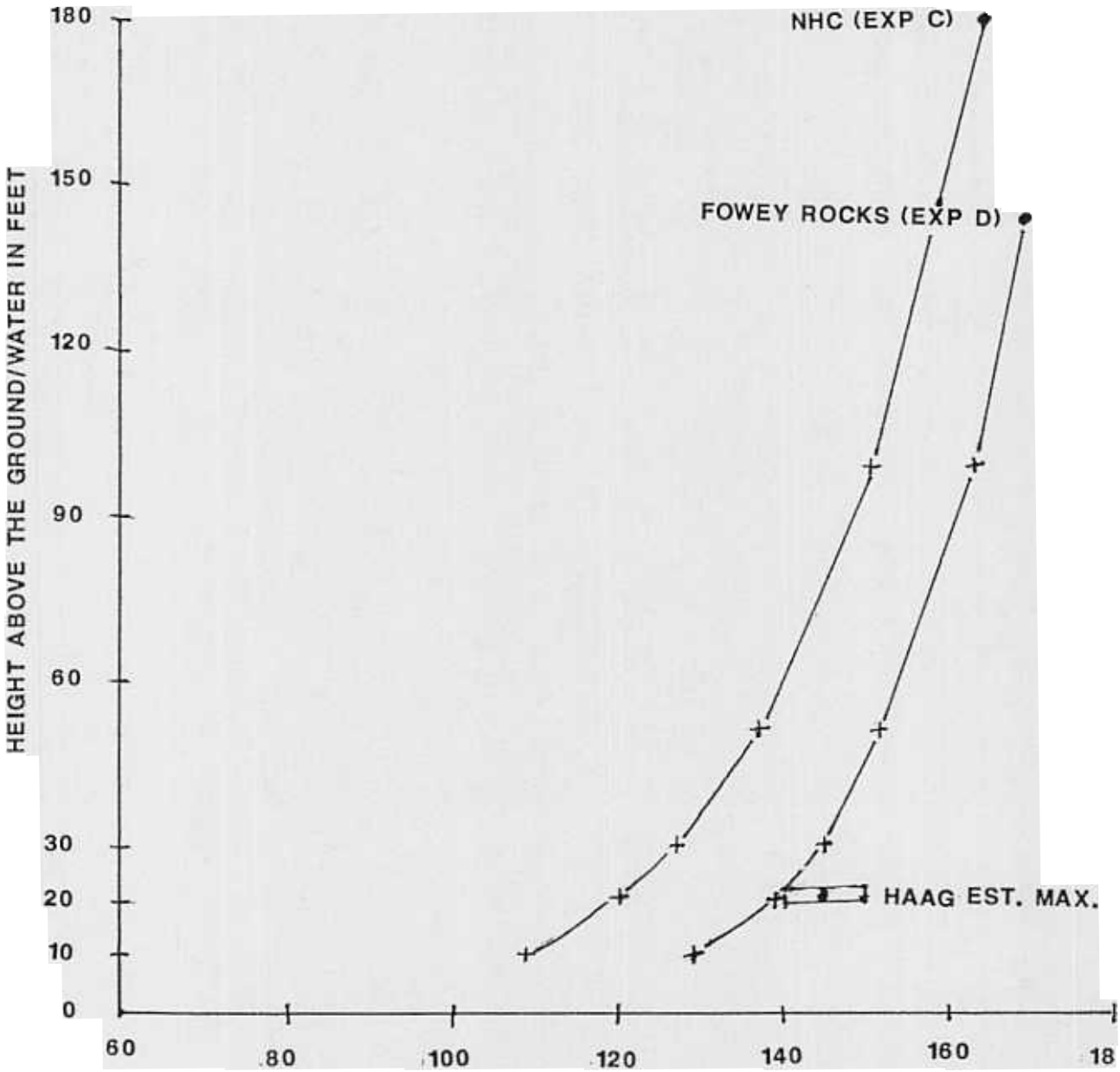
# MAXIMUM SUSTAINED WIND VELOCITY PROFILE




WIND SPEED IN MPH.

NOT A COMPLETE RECORD AS BOTH ANEMOMETERS FAILED DURING THE STORM

# PEAK GUST PROFILE




NOT A COMPLETE RECORD AS BOTH ANEMOMETERS FAILED DURING THE STORM

# POSITION ESTIMATES OF HURRICANE ANDREW
## AUGUST 23 THROUGH AUGUST 26, 1992

| Date | Time (EDT) | Position Lat. | Position Long. | Max. Est. Wind Vel. | Direction & Heading | Central Pressure | Location of Center |
|---|---|---|---|---|---|---|---|
| 8-23 | 11AM | 25.4N | 75.0W | 135MPH | W 16MPH | 27.46in | 330 E Miami |
| | 2PM | 25.4N | 75.8W | 150MPH | W 16MPH | 27.23in | 280 E Miami |
| | 5PM | 25.4N | 76.5W | 150MPH | W 16MPH | 27.26in | 240 E Miami |
| | 8PM | 25.4N | 77.3W | 145MPH | W 16MPH | 27.26in | 185 E Miami |
| | 11PM | 25.4N | 78.1W | 140MPH | W 16MPH | 27.67in | 135 E Miami |
| 8-24 | 1AM | 25.4N | 78.9W | 140MPH | W 16MPH | 27.79in | 85 E Miami |
| | 3AM | 25.4N | 79.7W | 140MPH | W 18MPH | 27.64in | 40 E Miami |
| | 5AM | 25.4N | 80.3W | 140MPH | W 18MPH | 27.52in | 10 E Homestd |
| | 7AM | 25.5N | 80.9W | 125MPH | W 18MPH | 27.91in | 75 SE Naples |
| | 9AM | 25.6N | 81.8W | 140MPH | W 18MPH | 27.91in | 45 SE Naples |
| | 11AM | 25.7N | 82.1W | 140MPH | W 18MPH | 27.91in | 40 SW Naples |
| | 2PM | 25.7N | 83.1W | 140MPH | W 18MPH | 27.95in | 85 SW Naples |
| | 5PM | 25.8N | 83.9W | 140MPH | W 18MPH | 27.93in | 470 SE New Orl |
| | 8PM | 26.1N | 84.9W | 140MPH | W 18MPH | 27.82in | 410 SE New Orl |
| | 11PM | 26.3N | 85.7W | 140MPH | W 17MPH | 27.91in | 365 SE New Orl |
| 8-25 | 1AM* | 26.5N | 86.8W | 140MPH | W 18MPH | 27.97in | 305 SE New Orl |
| | 4AM | 26.8N | 87.4W | 140MPH | NW 17MPH | 28.02in | 270 SE New Orl |
| | 7AM | 27.2N | 88.4W | 140MPH | NW 17MPH | 27.95in | 210 SE New Orl |
| | 10AM | 27.5N | 89.2W | 140MPH | NW 17MPH | 27.88in | 175 SE New Orl |
| | 1PM | 27.8N | 89.8W | 140MPH | NW 17MPH | 27.85in | 150 S New Orl |
| | 4PM | 28.2N | 90.3W | 140MPH | NW 16MPH | 27.52in | 125 S New Orl |
| | 6PM | 28.5N | 90.4W | 140MPH | NW 13MPH | 27.73in | 105 S New Orl |
| | 8PM | 28.7N | 90.7W | 140MPH | NW 13MPH | 27.75in | 140 SE Lafayet |
| | 10PM | 29.0N | 91.1W | 140MPH | NW 13MPH | 28.03in | 100 SE Lafayet |
| | MID | 29.2N | 91.3W | 125MPH | NW 11MPH | 28.17in | 85 SE Lafayet |
| 8-26 | 2AM | 29.4N | 91.5W | 120MPH | NW 11MPH | 28.17in | 70 SE Lafayet |
| | 4AM | 29.7N | 91.7W | 115MPH | NW 12MPH | 28.20in | 40 SE Lafayet |
| | 6AM | 29.9N | 91.7W | 115MPH | NW drift | NA | 30 SE Lafayet |
| | 8AM | 30.2N | 91.7W | 100MPH | NW drift | NA | 30 SW Baton R |
| | 10AM | 30.5N | 91.6W | 75MPH | N 8MPH | NA | 25 W Baton R |
| | NOON** | 30.7N | 91.6W | 65MPH | N 8MPH | NA | 25 NW Baton R |
| | 2PM | 30.9N | 91.6W | 55MPH | N 8MPH | NA | 40 S Natchez |
| | 4PM | 31.2N | 91.5W | 50MPH | N 8MPH | 29.92in | 25 SW Natchez |

*CST time begins **Andrew was downgraded to a Tropical Storm

# AIRCRAFT RECONNAISSANCE REPORTS FOR HURRICANE ANDREW
## AUGUST 23 through AUGUST 26, 1992

| Date | Time (EDT) | Eye Position Lat. (DEG/MIN) | Long. (DEG/MIN) | 700mb Wind Max Vel/Location (MPH/DIR/DEG/NM) | Lowest Pressure (MB) | Eye Dimension & Character (NM/Remarks) |
|---|---|---|---|---|---|---|
| 8-23 | 8:24AM | 25-22 | 74-19 | 143 SW 132 8 | 934 | 11 CLOSED |
| | 10:03AM | 25-19 | 74-45 | 164 NW 246 6 | 930 | 8 CLOSED |
| | 11:27AM | 25-24 | 75-04 | 196 SE 35 7 | 926 | 8 CLOSED |
| | 12:48PM | 25-24 | 75-29 | 156 N 260 6 | 922 | 8 CLOSED |
| | 1:53PM | 25-27 | 75-42 | 177 SE 81 7 | 923 | 8 CLOSED |
| | 4:45PM | 25-28 | 76-32 | 137 N 263 6 | 927 | 8/20 CLOSED |
| | 6:32PM | 25-27 | 76-59 | 146 E 340 5 | 923 | 8/20 CLOSED |
| | 8:13PM | 25-23 | 77-32 | 133 SE 56 6 | 931 | 8/20 CLOSED |
| | 10:20PM | 25-26 | 78-13 | 133 N 30 8 | 937 | 20 CLOSED |
| 8-24 | 12:10AM | 25-22 | 78-49 | 161 E 10 15 | 941 | 20 CLOSED |
| | 1:46AM | 25-22 | 79-20 | 152 S 90 13 | 936 | 20 CLOSED |
| | 4:04AM | 25-26 | 80-01 | 176 W 180 8 | 932 | 13 CLOSED |
| | ---------- | EYE OVER LAND - NO RECON REPORTS | | | | |
| | 11:02AM | 25-39 | 82-13 | 136 E 19 17 | 951 | 14 CLOSED |
| | 12:32PM | 25-41 | 82-41 | 123 S 96 14 | 947 | 17 CLOSED |
| | 1:51PM | 25-46 | 83-06 | 94 W 189 8 | 947 | 17 CLOSED |
| | 3:19PM | 25-50 | 83-34 | 113 N 251 10 | 946 | 16 CLOSED |
| | 4:51PM | 26-00 | 84-03 | 143 E 6 9 | 945 | 14 CLOSED |
| | 6:20PM | 26-02 | 84-30 | 135 SE 77 13 | 942 | 12 CLOSED |
| | ---------- | BEGIN CDT TIME | ---------- | | | |
| | 7:17PM | 26-09 | 85-09 | 107 S 100 16 | 945 | 13 CLOSED |
| 8-25 | 1:11AM | 26-40 | 86-51 | 123 E 342 25 | 948 | 14 CLOSED |
| | 3:21AM | 26-52 | 87-28 | 121 SE 91 23 | 949 | 12 OPEN EAST |
| | 4:37AM | 26-59 | 87-48 | 99 W 184 18 | 949 | 12 OPEN EAST |
| | 6:20AM | 27-13 | 88-14 | 118 N 257 15 | 946 | 10 OPEN SOUTH |
| | 8:10AM | 27-22 | 88-38 | 153 E 346 19 | 946 | 30 CLOSED |
| | 11:05PM | 27-25 | 88-54 | 147 SE 71 19 | 944 | 30 CLOSED |
| | 12:17PM | 27-42 | 89-37 | 146 S 105 16 | 943 | 25 CLOSED |
| | 1:40PM | 27-51 | 89-50 | 142 NW 228 9 | 939 | 20 CLOSED |
| | 3:10PM | 28-05 | 90-04 | 144 N 260 16 | 936 | 22 CLOSED |
| | 4:35PM | 28-16 | 90-15 | 155 E 343 16 | 939 | 18 CLOSED |
| | 6:29PM | 28-31 | 90-36 | 138 S 107 18 | 940 | 25 CLOSED |
| | 9:07PM | 28-42 | 90-59 | 144 SE 70 17 | 950 | 23 CLOSED |
| | 10:44PM | 28-51 | 91-07 | 120 W 190 13 | 951 | 25 CLOSED |
| | 11:38AM | 28-58 | 91-13 | 107 NW 250 15 | 954 | 25 CLOSED |
| 8-26 | 12:26AM | 29-04 | 91-17 | 152 S 80 20 | 952 | 18 CLOSED |
| | 1:24AM | 29-14 | 91-22 | 98 NW 250 12 | 954 | 18 CLOSED |
| | 2:24AM | 29-21 | 91-27 | 148 S 110 20 | 956 | 22 CLOSED |
| | 3:06AM | 29-28 | 91-33 | 93 NW 250 13 | 957 | 22 CLOSED |
| | 3:31AM | 29-32 | 91-32 | 129 S 90 22 | 955 | 20 CLOSED |
| | 6:02AM | 29-52 | 91-39 | 110 S 98 21 | --- | 12 CLOSED N |

MIAMI, FL INTERNATIONAL AIRPORT
WEATHER OBSERVATIONS AUGUST 24, 1992

| Time (GMT) | Wind Dir. (Degrees) | -Speed (MPH) | Gust (MPH) | Altimeter* (Inches of Mercury) | Remarks |
|---|---|---|---|---|---|
| 12:50AM | N 350 | 17 | 35 | 29.89 | |
| 1:50AM | N 350 | 17 | 29 | 29.84 | Light rain begins |
| 2:27AM | N 360 | 29 | 40 | 29.79 | PRESFR, light rain |
| 2:32AM | N 360 | 29 | 46 | 29.79 | Heavy Rain, Cb N |
| 2:38AM | N 360 | 29 | 40 | 29.77 | Mod. Rain, PRESFR |
| 2:53AM | N 360 | 29 | 40 | 29.73 | Light Rain, PRESFR |
| 3:05AM | N 350 | 35 | 52 | 29.69 | Heavy Rain, PRESFR |
| 3:15AM | N 350 | 35 | 58 | 29.68 | Mod. Rain, PRESFR |
| 3:55AM | N 360 | 46 | 69 | 29.54 | Mod. Rain, PRESFR |
| 4:50AM | N 360 | 63 | 92 | 29.35 | Mod. Rain, PRESFR |
| 5:23AM | NE 40 | 80 | 115 | 29.35 | Heavy Rain 29.26 lowest |
| 5:50AM | E 100 | 86 | 115 | 29.42 | Heavy Rain, PRESRR |
| 6:50AM | SE 120 | 86 | 104 | 29.63 | Heavy Rain, PRESRR |
| 7:17AM | SE 140 | 80 | 92 | 29.74 | Mod. Rain, PRESRR |
| 7:52AM | SE 160 | 69 | 80 | 29.81 | Light Rain, PRESRR |
| 8:50AM | E 100 | 52 | 80 | 29.84 | Light Rain |
| 9:50AM | SE 120 | 29 | 46 | 29.89 | Light Rain |
| 10:50AM | SE 120 | 29 | 46 | 29.99 | TCu SE, PRESRR |
| 11:54AM | S 180 | 14 | -- | 29.99 | Rain ended 13 |

* Barometric pressure at ground level.

WEST PALM BEACH, FL AIRPORT
WEATHER OBSERVATIONS AUGUST 24, 1992

| Time (GMT) | Wind Dir. (Degrees) | -Speed (MPH) | Gust (MPH) | Altimeter* (Inches of Mercury) | Remarks |
|---|---|---|---|---|---|
| 12:50AM | N 20 | 35 | 52 | 29.94 | Rain, Cb NE-OVHD |
| 1:25AM | N 20 | 29 | 37 | 29.93 | FQT LTGIC NE |
| 1:36AM | NE 40 | 30 | 56 | 29.95 | Heavy rain, T ALQDS |
| 1:52AM | NE 50 | 29 | 41 | 29.95 | Peak gust 56 |
| 2:33AM | NE 40 | 23 | 35 | 29.93 | Light Rain |
| 2:51AM | NE 50 | 20 | 35 | 29.91 | FQT LTGIC N, Peak 41 |
| 3:14AM | NE 50 | 20 | 30 | 29.91 | Light rain |
| 3:50AM | NE 50 | 35 | 45 | 29.89 | Cb ALQDS, Peak 45 |
| 4:50AM | E 70 | 37 | 54 | 29.88 | Peak gust 56 |
| 5:50AM | E 90 | 32 | 45 | 29.88 | Cb ALQDS, LTGIC NE |
| 5:59AM | E 110 | 32 | 53 | 29.90 | Heavy Rain, OCNL LTG |
| 6:33AM | E 100 | 43 | 54 | 29.91 | Rain, TE MVD S. |
| 6:52AM | E 80 | 35 | 49 | 29.91 | Rain, Peak gust 59 |
| 7:15AM | SE 120 | 35 | 49 | 29.92 | CB ALQDS MVG W |
| 7:51AM | SE 110 | 29 | 40 | 29.94 | CB ALQDS |

* Barometric pressure at ground level.

FORT MYERS, FL PAGE AIRPORT
WEATHER OBSERVATIONS AUGUST 24, 1992

| Time (GMT) | Wind Dir. (Degrees) | -Speed (MPH) | Gust (MPH) | Altimeter* (Inches of Mercury) | Remarks |
|---|---|---|---|---|---|
| 6:46AM | N 20 | 16 | -- | 29.90 | |
| 7:15AM | NE 40 | 14 | 25 | 29.91 | Light rain begins |
| 7:47AM | NE 40 | 18 | 28 | 29.91 | Light rain |
| 8:17AM | NE 40 | 26 | 41 | 29.90 | Rain |
| 8:48AM | NE 40 | 21 | 29 | 29.89 | Light rain |
| 9:12AM | NE 40 | 23 | 35 | 29.87 | Light rain |
| 9:47AM | NE 40 | 23 | 35 | 29.85 | Light rain |
| 10:45AM | NE 60 | 23 | 44 | 29.86 | Light rain |
| 11:46AM | E 80 | 23 | 38 | 29.87 | Light rain |
| 12:20PM | E 70 | 29 | 44 | 29.89 | |
| 12:47PM | E 70 | 23 | 39 | 29.91 | Light rain |
| 1:25PM | E 90 | 17 | 29 | 29.93 | Light rain |
| 1:47PM | E 100 | 23 | 40 | 29.94 | Light rain |
| 2:30PM | E 90 | 17 | 29 | 29.94 | Rain ended |

* Barometric pressure at ground level.

FORT MYERS, FL SOUTHWEST REGIONAL AIRPORT
WEATHER OBSERVATIONS AUGUST 24, 1992

| Time (GMT) | Wind Dir. (Degrees) | -Speed (MPH) | Gust (MPH) | Altimeter* (Inches of Mercury) | Remarks |
|---|---|---|---|---|---|
| 6:45AM | NE 30 | 20 | 35 | 29.89 | Light rain |
| 7:27AM | NE 30 | 25 | 44 | 29.89 | Rain |
| 7:45AM | NE 30 | 26 | 41 | 29.88 | Heavy rain |
| 8:47AM | NE 40 | 26 | 40 | 29.85 | Rain |
| 9:17AM | NE 50 | 26 | 46 | 29.84 | Light rain |
| 9:47AM | NE 60 | 29 | 52 | 29.83 | Light rain |
| 10:46AM | E 70 | 35 | 51 | 29.83 | Light rain |
| 11:47AM | E 100 | 35 | 47 | 29.86 | Light rain |
| 12:17PM | E 100 | 29 | 51 | 29.87 | Light rain |
| 12:47PM | E 100 | 29 | 51 | 29.91 | Light rain |
| 1:46PM | E 100 | 31 | 48 | 29.95 | Rain |

* Barometric pressure at ground level

BATON ROUGE, LA METROPOLITAN AIRPORT
WEATHER OBSERVATIONS AUGUST 26, 1992

| Time (GMT) | Wind Dir. (Degrees) | -Speed (MPH) | Gust (MPH) | Altimeter (Inches) | Remarks |
|---|---|---|---|---|---|
| 12:52AM | E 90 | 20 | 24 | 29.88 | Light rain |
| 1:50AM | E 90 | 26 | 37 | 29.83 | Rain |
| 2:00AM | E 70 | 25 | 35 | 29.81 | Rain |
| 2:50AM | E 80 | 29 | 38 | 29.75 | PRESFR |
| 3:19AM | E 80 | 28 | 39 | 29.75 | Heavy Rain |
| 3:22AM | E 70 | 25 | 39 | 29.74 | Heavy Rain |
| 3:55AM | SE 120 | 24 | 40 | 29.71 | Peak gust 59 |
| 4:20AM | SE 110 | 30 | 51 | 29.70 | Rain |
| 4:26AM | SE 120 | 29 | 37 | 29.69 | Heavy rain |
| 4:54AM | SE 120 | 33 | 51 | 29.67 | Rain, Peak gust 52 |
| 5:51AM | S 190 | 39 | 53 | 29.60 | Rain, PRESFR |
| 6:54AM | S 190 | 45 | 60 | 29.55 | Rain, Peak gust 60 |
| 7:51AM | SE 120 | 44 | 59 | 29.50 | Rain, Peak gust 61 |
| 8:55AM | SE 120 | 40 | 59 | 29.50 | Heavy Rain, Peak 69 |
| 9:54AM | SE 140 | 46 | 63 | 29.44 | Heavy TSTM, Peak 59 |
| 10:51AM | SE 150 | 40 | 59 | 29.46 | Heavy TSTM, Peak 70 |
| 11:02AM | SE 160 | 40 | 54 | 29.46 | Heavy Rain |
| 11:51AM | SE 150 | 41 | 53 | 29.51 | Heavy Rain |
| 12:51PM | SE 150 | 41 | 53 | 29.51 | Heavy Rain, Peak 61 |

LAFAYETTE, LA METROPOLITAN AIRPORT
WEATHER OBSERVATIONS AUGUST 26, 1992

| Time (GMT) | Wind Dir. (Degrees) | -Speed (MPH) | Gust (MPH) | Altimeter (Inches) | Remarks |
|---|---|---|---|---|---|
| 12:51AM | NE 40 | 26 | 35 | 29.81 | Light rain |
| 1:42AM | NE 30 | 29 | 40 | 29.76 | PRESFR |
| 1:50AM | N 20 | 28 | 39 | 29.74 | PRESFR |
| 2:09AM | NE 40 | 29 | 37 | 29.72 | |
| 2:50AM | N 10 | 31 | 44 | 29.66 | Peak Wind 45 @ 1:56a |
| 3:37AM | N 20 | 35 | 53 | 29.59 | PRESFR |
| 3:50AM | N 30 | 35 | 46 | 29.58 | Peak Wind 53 @ 3:29a |
| 4:50AM | N 20 | 46 | 60 | 29.46 | Heavy Rain, PRESFR<br>Peak Wind 60 @ 4:43a |
| 5:50AM | N 10 | 46 | 64 | 29.33 | Heavy Rain, PRESFR<br>Peak Wind 64 @ 5:45a |
| 6:52AM | N 360 | 53 | 69 | 29.26 | Heavy Rain, PRESFR<br>Peak Wind 71 @ 5:57a |
| 7:50AM | N 360 | 46 | 62 | 29.25 | Peak Wind 63 @ 7:25a |
| 8:50AM | NW 340 | 46 | 58 | 29.31 | Peak Wind 58 @ 8:45a |
| 9:22AM | NW 330 | 44 | 55 | 29.35 | PRESRR |
| 9:50AM | NW 330 | 46 | 60 | 29.40 | Peak Wind 62 @ 9:35a |
| 10:51AM | W 290 | 32 | 47 | 29.50 | Peak Wind 52 @ 10:35a |
| 11:52AM | W 280 | 28 | 38 | 29.59 | Peak Wind 44 @ 11:22p |

## MAXIMUM SUSTAINED WINDS, GUSTS, and PEAK GUSTS - HURRICANE ANDREW

| Location | Date | Sustained (MPH/DIR/Time) | Gust (MPH/DIR/Time) | Peak (MPH/DIR/Time) |
|---|---|---|---|---|
| Miami, FL | 8/24 | 86 E 5:50AM | 115 E 5:50AM | |
| Fort Myers, FL #1 | 8/24 | 29 E 12:20PM | 54 E 12:20PM | |
| Fort Myers, FL #2 | 8/24 | 35 E 10:46AM | 52 E 9:47AM | |
| West Palm Beach, FL | 8/24 | 43 E 6:33AM | 54 E 6:33AM | 59 SE 6:31AM |
| Alexandria, LA | 8/26 | 31 NE 11:10AM | 40 NE 9:50AM | |
| Baton Rouge, LA | 8/26 | 48 SE 9:52AM | 63 SE 9:54AM | 70 SE 10:20AM |
| Lafayette, LA | 8/26 | 53 N 6:52AM | 69 N 6:52AM | 71 N 5:57AM |
| Lake Charles, LA | 8/26 | 24 NW 4:52PM | 39 NW 12:11PM | |
| New Orleans Intl | 8/26 | 39 SE 4:50AM | 62 SE 4:50AM | 62 SE 4:41AM |
| New Orleans | 8/26 | 30 E 3:26AM | 46 E 4:37AM | 48 SE 7:35AM |

## STORM SURGE MEASUREMENTS WEST FLORIDA COAST

| | Location | County | Max. Surge | Date and time |
|---|---|---|---|---|
| 1. | Homosassa | Citrus | + 1.5 ft. | 8/25 1100 AM |
| 2. | Gulf Harbors | Pasco | + 1.5 ft. | 8/25 930 AM |
| 3. | Indian Rocks | Pinellas | + 1.0 ft. | 8/25 1100 AM |
| 4. | Anna Maria Isl. | Manatee | + 1.5 ft. | 8/25 1000 AM |
| 5. | Venice | Sarasota | + 1.8 ft. | 8/25 1100 AM |
| 6. | Fort Myers | Lee | + 2.0 ft. | 8/25 1200 PM |