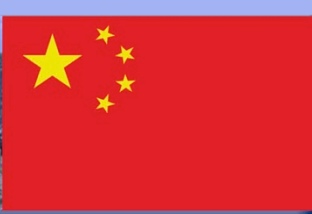




# Safety Management Measures and Experience of Preventing and Fighting Typhoon at Transport Hub



Command Center of Shanghai Municipal  
Transport and Port Authority



# OUTLINE

- I . Functions and Impact of Transport Hub in the city**
- II . China's Largest Comprehensive Transport Hub in Shanghai**
- III . Risk Assessment on Operational Safety under typhoon at Transport Hub**
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## I .Functions and Impact of Transport Hub in the city

- Collecting, distributing, transiting of passengers; Bridge and connection with outside
- Complex of realizing multi-directions and multi-means of transport
- Generator of huge material and cultural needs due to large passenger flow volume

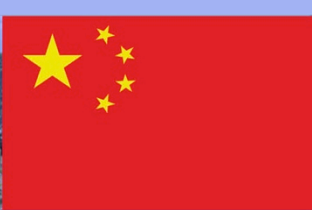
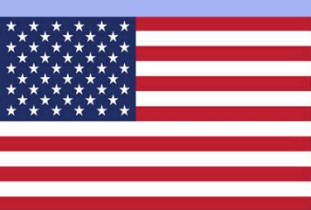




## II .China's Largest Comprehensive Transport Hub in Shanghai

Located west to Hongqiao Airport, around 13 KM west of downtown, Hongqiao Transport Hub, with an unprecedented design, covers a planning area of 26.26 km<sup>2</sup>, an that embraces all integral transport complex interchanges among aviation, high-speed train, bullet train, maglev train, metro, long-haul coach, taxi, and bus.





Apart from various means of transport it connects, Hongqiao Transport Hub is also equipped with supporting service facilities such as parking lots, hotels, business service and etc. It not only conserves land resources, but also greatly increases traffic operational efficiency, where passengers can distribute rapidly to meet their travel demands.

The construction of Hongqiao Transport Hub will accelerate the shaping-up and optimizing of modern transport system in Yangtze-Delta Region, and thus achieve the target of “promoting economic integration of the region through transport integration” to provide strong support for the region’s economic prosperity and structure optimization.

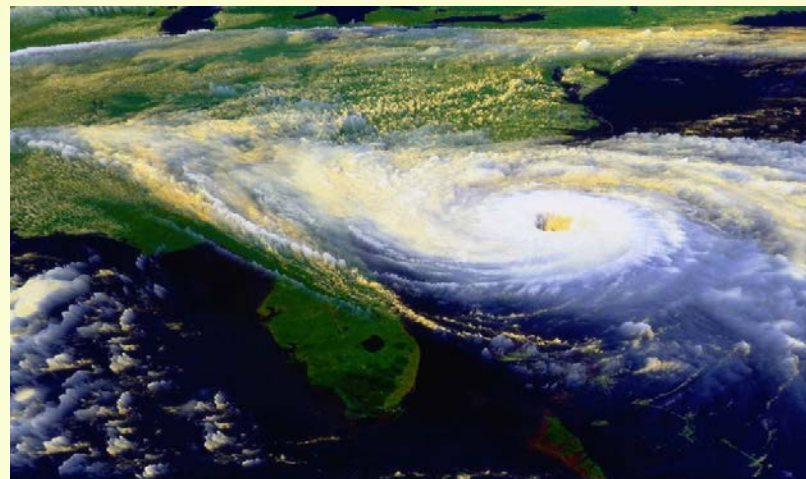


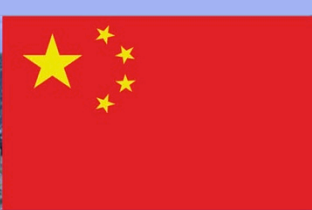
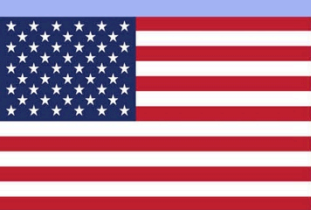


### III. Risk Assessment on Operational Safety under typhoon at Transport Hub

#### 1. Main Damages

The most direct damage to transport hub caused by typhoon is building destruction in the hub. Typhoon is always coming along with level-9 strong wind or above and heavy rainfall from 150mm to 300mm. Major buildings in the hub are usually composed of long-span steel structure and large glass walls, which might cause hub damages, like fall-off of building's exterior structure, structural water seepage, partial collapse of buildings.





## 2. Secondary Damages

Typhoon tends to bring about other secondary disasters. Failure of key equipments may cause vehicle and airplane malfunction and traffic accidents, or damages to power supply devices, airport runways, and metro routes, and thus further cause stampede and mass injuries.





### 3. Affecting Scope

Usually the affecting scope affected by Typhoon is easy to spread rapidly. For instance, if situation is not controlled timely, it might cause the break off or delay of various means of transport like aviation, rail and road, even paralyze the backbone of public transport, metro network. Especially for expansion of transport hub which covers diversified transport options, tourists might gather and be stranded when scheduled transports are delayed or cancelled, and urban public transport are paralyzed.







## IV. Risk Factors for Transport Hub against Typhoon

### 1. Human factors

#### 1) Passengers

Passengers being stuck in transport hub due to bad weather like typhoon might lead to mass incidents. Stranded passengers should be pacified and evacuated soon.





## 2) Working Staffs

Working staffs are required to be highly qualified to handle accidents skillfully, carry out effectively contingency plan and satisfy the demands of stranded passengers.





## 2. Equipment Factors

We need to make sure equipment system comprising power, transport, telecom, signal, ventilation and smoke control is in good condition.

## 3 .Environment Factors

Environment refers to both natural environment and social environment.

## 4. Management Factors

Safety management body and safe operation of transport hub.





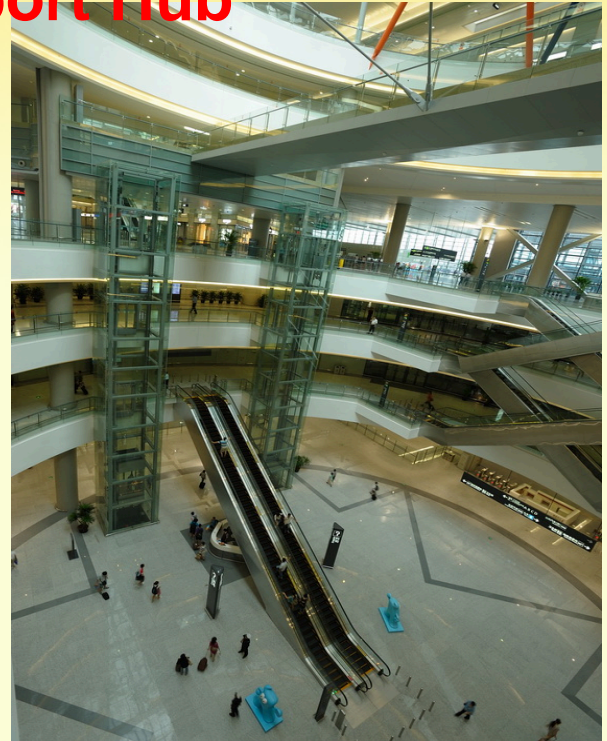
## V. Safety Management Measures of Preventing and Fighting Typhoon at Transport Hub

### 1. Principles

Human-oriented, prevention first, quick response, maximum support for people safety and operational stability

### 2. Overall Targets

Timely alarming, strong defense, efficient coordination, effective solution





### 3. Management Schemes

Emergency Response Center (ECR) is in place to deal with information related to emergency and passengers.

### 4. Prevention Priority

We focus on monitoring danger source, routine inspection and maintenance, and get fully prepared to defend typhoon.





## Key Defending Areas:

- 1) Facilities and Equipments: signaling, radar, telecom facilities and equipments in airports, highways, and metro
- 2) Sites: surface water-prone places like power substation, hangar, service shop; entry and exit to transport hub, steel-structured terminals, glass walls; metro stations
- 3) Inspections: check up facilities based on weather forecast; inspect steel-pipe drainage system and pump station; check up steel-structured buildings surface, low-floor or floods-prone road section



## 5. Alarming System

### Alarming information is classified into 6 levels:

	Name of Alarms	Metrological Alarming Classification	Affecting Scope	Accident Nature	Emergency Response Guidance
1	Level 1	Typhoon red alarm	All function areas of transport hub, or beyond emergency handling ability	Extraordinarily serious, calling for city-level coordination to respond	Response expansion
2	Level 2	Typhoon orange alarm	3 or more function areas	Serious, calling for transport hub leadership and other related or member parties in coordination to respond	Joint response
3	Level 3	Typhoon yellow alarm	2 function areas	Quite serious, calling for transport hub leadership and affected member parties to respond	Cross-departments coordination
4	Level 4	Typhoon blue alarm	1 function area	requiring operator to respond	Independent response
5	Level 5	General alarm	General weather forecast and alarm		
6	Level 6	Dedicated alarm	Dedicated alarm for peculiar period		



## **6. Training and Drills**

Training and drills are strengthened, and passenger's awareness of disaster prevention is raised through education.

## **7. Drainage Equipments**

Effective drainage system is designed to avoid floodwaters.

## **8. Contingency Planning**

Contingency planning system is established to reduce loss of life and property at a maximum.

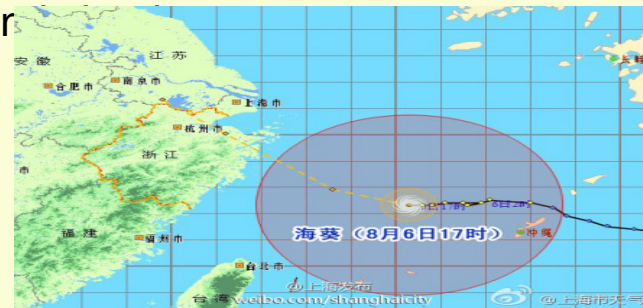


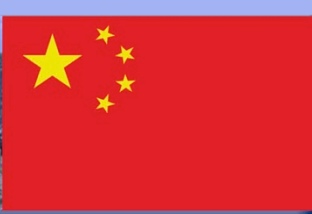


## VI. An example illustrates how Shanghai Hongqiao Comprehensive Transportation Hub successfully dealt with strong Typhoon“Sea Anemone” in 2012 and our experience and measures

### 1. Impact

On Aug.8, 2012, strong typhoon “Sea Anemone” passed over Shanghai, and its strong wind and sudden downpour had a serious impact on the normal operation of Shanghai. That whole day at Hongqiao Hub, 708 flights cancelled, 2000 passengers stranded at Terminal 1 and 2, lots of high-speed trains delayed and 33 trains for southeast coastal areas and Hongzhou stopped or shortened their running range. Meanwhile some sections of Metro Line 2 passing Hongqiao Hub suspended their operation, and buses were used to support transport. And further cross-province passenger routes were wholly stopped operation due to highway closure.





## 2. Countermeasures

- 1) Conducted checks on facilities, equipments, architecture, means of transport and resources of typhoon and flood prevention inside the hub to eliminate hidden danger, based on early-warning notice. And carry out responsibilities and ask all involved units to be ready to respond to.
- 2) Timely coordinated bus, taxi companies to deploy adequate vehicles to distribute stranded passengers. We mobilized 13000 taxis, 335 shuttle buses and evacuated 20000 passengers to guarantee a safe evacuation of stranded passengers due to rail transport and flight out of operation.



- 3) Continuously monitored flight updates after a long time delay, and airport telephone inquiry sent people to operation command center.
- 4) News released in time. Offer accurate traffic information to passengers by TV, radio and official micro-blog.
- 5) Focused on major prevention. Esp. on aircraft mooring, bridge reinforcement, airport terminal, rail transport and signal chain equipments of high-speed train, and the safety of vehicles of subway and high-speed train.



6) On Aug.7, when Hongqiao Hub was on Orange Emergency Response status, all flood and typhoon prevention facilities and equipments were checked, hanging objects high in the air were reinforced, construction were stopped, all terminals and pump stations were ready for pre-draining, and airport authority, rail company and police deployed personnel to ensure the safety of the hub.

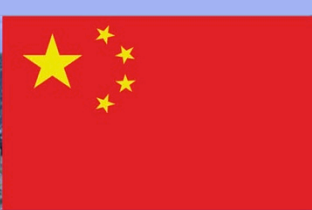
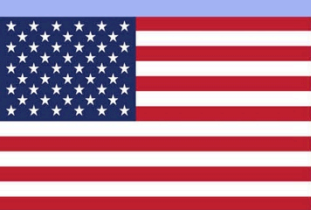


7) Aug. 8, emergency force was fully deployed, and damaged facilities like escalators were recovered in the first time. Sandbags were pre-stacked at each entry & exit and waterproof walls were set up. As we were well-prepared, although some trees were fallen and temporary building roofs were damaged when typhoon passed over, the facilities and equipments inside the hub were fine and both the operation and service were under control.



9) Experience and lessons. Some detailed weaknesses were exposed. As information was not interconnected among airport, railway and long-haul passenger transport, railway tickets couldn't be bought at airport, while flight schedule could not be inquired at the railway station.





**THANK YOU!**

