Port Layout and Parameters

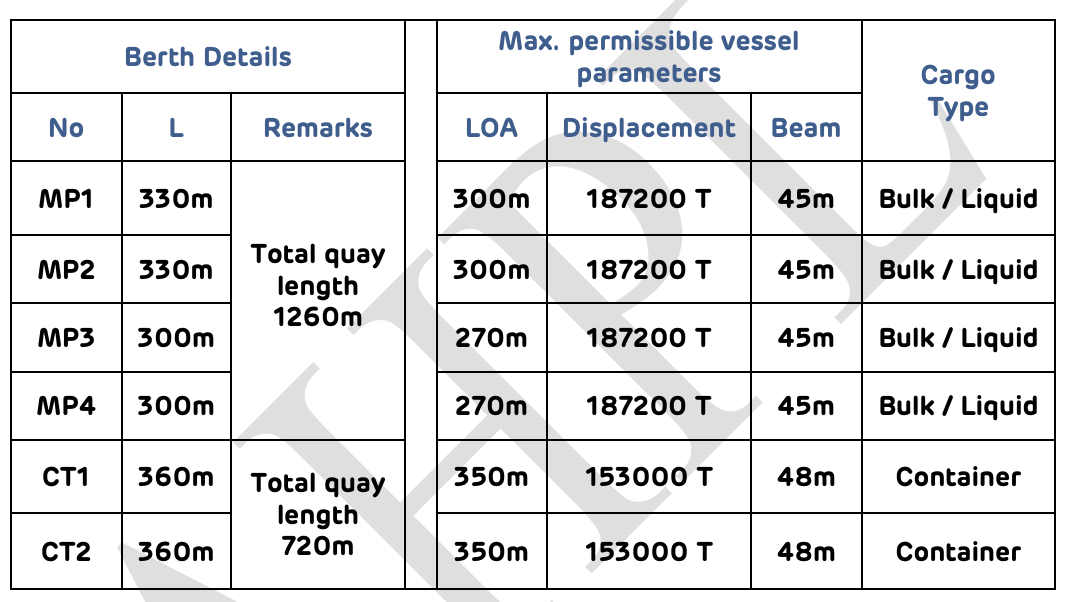
*Survey Hazira Port berth inventory: 11 berths (3 container, 5 general cargo, 3 liquid), channel draft 11 m, yard footprints (open: 80 000 m2; container yard: 50 ha), and assumed handling rates (25000t/day bulk; 30 moves/hr crane).*

Hazira Port ([Wikipedia](https://en.wikipedia.org/wiki/Hazira_Port?utm_source=chatgpt.com))

* Also known as Surat Port
* Deep-water liquefied natural gas terminal
  + Liquefied natural gas terminals are used for managing import and export of LNG (which is a natural gas that is cooled to a liquid - [source)](https://en.wikipedia.org/wiki/Liquefied_natural_gas)
  + Deep-water meaning that it is a manmade structure located beyond state boundaries in the water ([source)](https://www.maritime.dot.gov/ports/deepwater-ports-and-licensing/frequently-asked-questions#:~:text=A%20deepwater%20port%20is%20currently,of%20oil%20or%20natural%20gas)
  + Designed for Essar Steel – now owned by Adani Group
  + Located 20 miles southwest of Surat

**Berths:** “a designated location in a port or harbor used for mooring vessels,” berths are numbered and matched to ships based on length, draft (the vertical distance between the bottom of the ship and the waterline - [source)](https://en.wikipedia.org/wiki/Draft_(hull)#:~:text=The%20draft%20or%20draught%20of,loaded%20condition%20of%20the%20ship.) and cargo type ([source)](https://en.wikipedia.org/wiki/Shipping_terminal?)

* MP1-MP4: multipurpose berths for liquid/bulk cargo
* CT1, CT2: container berths
* Berthing speed limit: 10cm/sec
* MP1-MP3, CT1, CT2 has maximum permissible draft of 14m, MP4 has 13.0

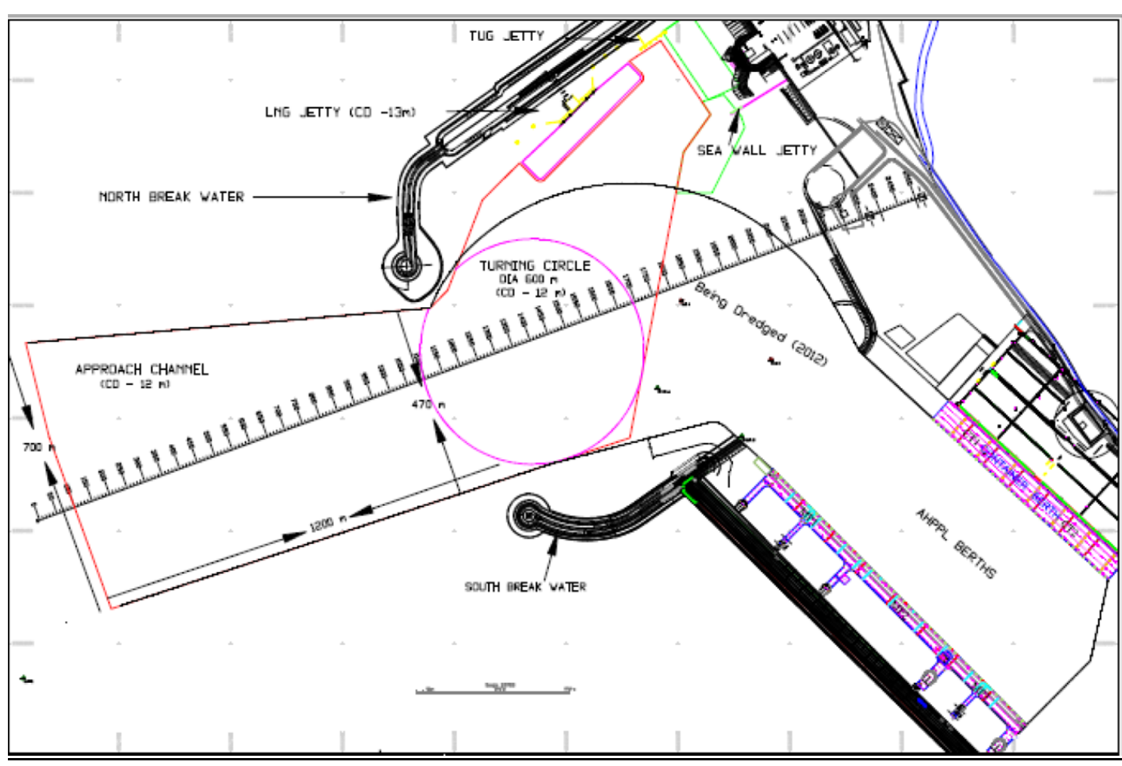


**Channel:** also known as an approach channel, is a waterway for vessels to navigate between the water and berths ([source)](https://www.lsd.law/define/ship-channel?utm_source=chatgpt.com)

* Water depth in approach channel: 15.5m
* Minimum UKC in approach channel is 15% of maximum draft and 10% of maximum draft in basement
* Minimum UKC alongside berth: 1m
  + UKC = “under keel clearance”
* “Maximum current in the approach channel at one ship’s length outside the breakwaters is 2.5 knots. Cross – current in opposite direction in the channel are not acceptable” ([p. 8)](https://www.adaniports.com/-/media/Project/Ports/PortsAndTerminals/Hazira-port-Documents/Documents/Port-Information-Book.pdf)
* “Minimum UKC not below 15% of the deepest draft in the channel, not below 10% of the deepest draft in the turning circle and inner basin and not below 1.0 meter at the berth.” ([p. 8)](https://www.adaniports.com/-/media/Project/Ports/PortsAndTerminals/Hazira-port-Documents/Documents/Port-Information-Book.pdf)
* “The limiting wave height is Hs = 1.5 m in combination with a wind speed of 24 Knots (10 minutes average wind speed).” ([p. 8)](https://www.adaniports.com/-/media/Project/Ports/PortsAndTerminals/Hazira-port-Documents/Documents/Port-Information-Book.pdf)

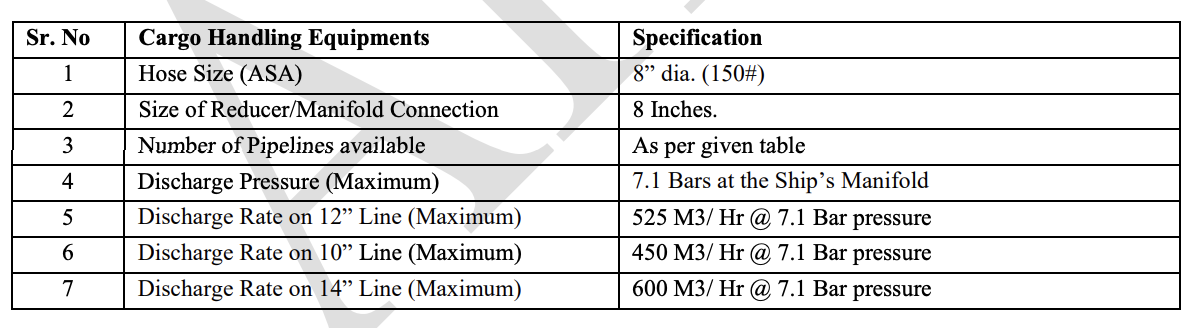
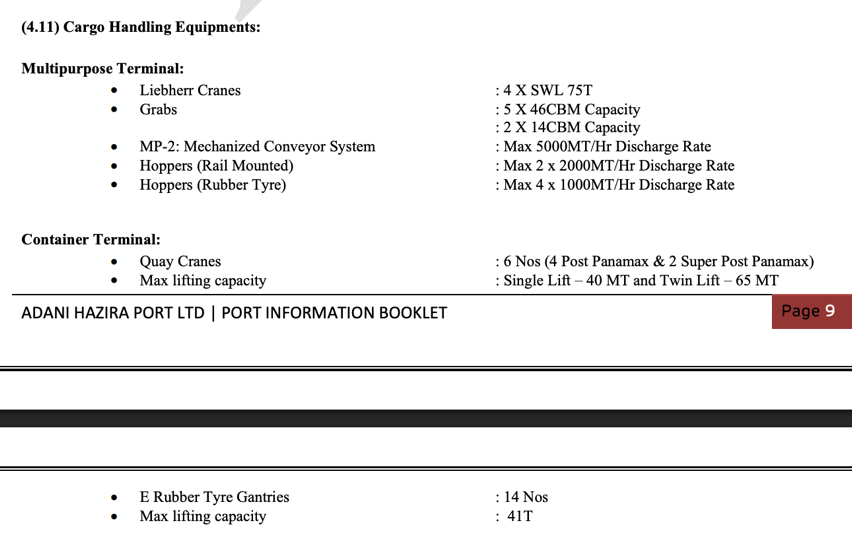
Yard Footprints

* “Currently we have 32 acres for empty container storage of 12000 TEU with an expansion capacity of another 10 acres” ([source)](https://www.hcy.co.in/)



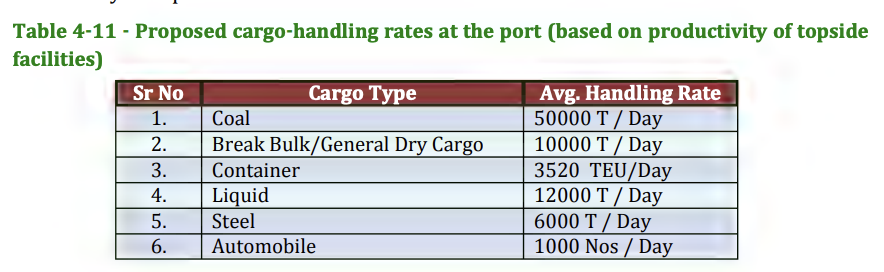
[p. 51 - General Layout](https://environmentclearance.nic.in/DownloadPfdFile.aspx?FileName=bK5vmGzO3+qM2SLLKydSdG6dOyyJeMUMNguR6djs0GyMGsM8678q79MdQUbBtpDi7fA%2Fwb+CRerTYbjlqWXXrN7ocZmfXdzvaq6FTpq2itdfP9sKTUQnRxYHEAwoGAFK&FilePath=93ZZBm8LWEXfg+HAlQix2fE2t8z%2FpgnoBhDlYdZCxzWF1OLE6RXe5MiAhSH8vdQ1&utm_source=chatgpt.com)

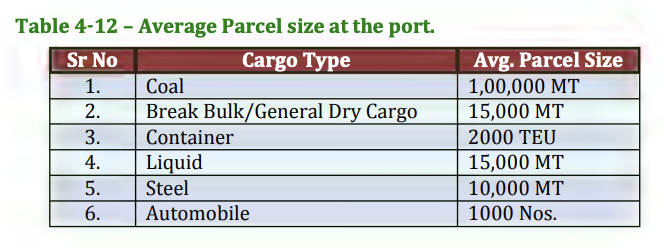
Handling Rates ([p. 9)](https://www.adaniports.com/-/media/Project/Ports/PortsAndTerminals/Hazira-port-Documents/Documents/Port-Information-Book.pdf)

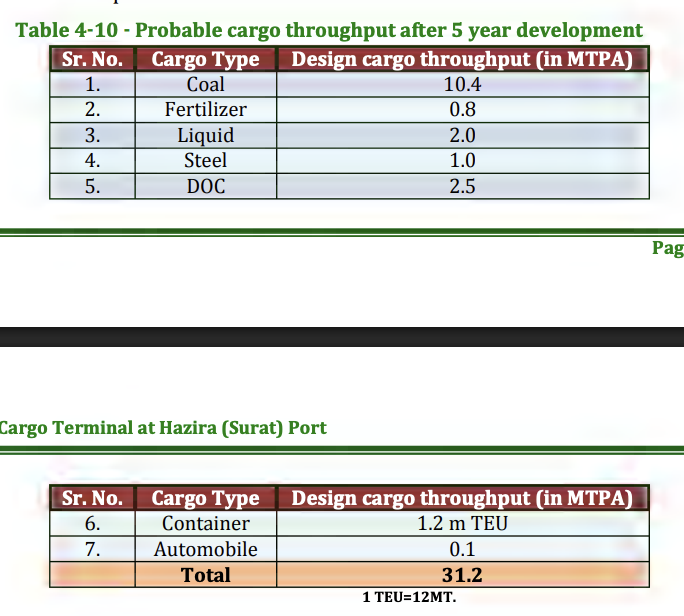


[Average Handling Rates (p. 63)](https://environmentclearance.nic.in/DownloadPfdFile.aspx?FileName=bK5vmGzO3+qM2SLLKydSdG6dOyyJeMUMNguR6djs0GyMGsM8678q79MdQUbBtpDi7fA%2Fwb+CRerTYbjlqWXXrN7ocZmfXdzvaq6FTpq2itdfP9sKTUQnRxYHEAwoGAFK&FilePath=93ZZBm8LWEXfg+HAlQix2fE2t8z%2FpgnoBhDlYdZCxzWF1OLE6RXe5MiAhSH8vdQ1&utm_source=chatgpt.com)

* “The number of berths required, is a function of cargo type and volume, and the expected cargo handling rates” (p. 63)







Sources for Research on Hazira Port:

* [Adani Ports official document](https://www.adaniports.com/-/media/Project/Ports/PortsAndTerminals/Hazira-port-Documents/Documents/Port-Information-Book.pdf)
* [Adani - Berthing Policy](https://www.adaniports.com/-/media/Project/Ports/PortsAndTerminals/Hazira-port-Documents/Tariff/Hazira-Berthing-Policy-and-Tariff-Structure-wef-from-1st-April-2024.pdf)
* [Shell - Port Information Book](https://phoenixmarine.in/media/assets//img/SHELL%20-%20Port%20Information%20Book%20Ver.pdf)
* [Detailed map](https://environmentclearance.nic.in/writereaddata/Online/TOR/0_0_10_Apr_2015_1455162201OVERALLPLOTPLANHAZIRA.pdf?utm_source=chatgpt.com)

Simulation Resources

* [Paper on Complex Port Simulations](https://pdf.sciencedirectassets.com/280203/1-s2.0-S1877050913X00080/1-s2.0-S1877050913010661/main.pdf?X-Amz-Security-Token=IQoJb3JpZ2luX2VjEAcaCXVzLWVhc3QtMSJHMEUCIHYwQA8G1ukWf0w24IwIdHDeBiW%2BrH%2B9HepQo4BPkLCyAiEA%2BJKEijBIvO9zaccENRFL%2BNb9VWm90ke1Z5DkFK21x4IqvAUIwP%2F%2F%2F%2F%2F%2F%2F%2F%2F%2FARAFGgwwNTkwMDM1NDY4NjUiDEDG4rn4rU5pNC5EISqQBbg0QHdvKjeVerU9PFztxQlficiYnHD8e9l3%2FBFcw4JQTcOjUOzRtTsVwbjYICkTVH2Dueby09cAwsiBCUX%2B7B4P%2BdET1WPSC2m1tioNf8r%2FUYSZUXY37s2BP0WD%2FFNZSslYjYXQtD5DzMCn8Z%2BaEb4l1oDfQwJFWwU1VPO31%2BRkODL%2BbBTSKvfekuOq4NfA5BFdXJo6Jpb%2BbisjLMQ2UilJxA7neS1emBEl2PLW60ZpZCk83M1DWpgsV%2FHLiPp3Sx6qYLEoQ3RLVLHVZxYGQ27mL0SM%2FY1UAMUoiqRlGTK%2Bf%2FHo2BW0RnSxh0CSW7vPc%2FUnp0fCisDy93WaeAVsS23swgEcRa6cVQIuqlkdOG5O%2BI3tHolvG3L5HrbZH3jeLTNK7YGtJKgRzomjn%2FKZ58802DjWwjtZysn80tDLJBJu95irC1WYNARwSEicIUqnAP0OhDIHAKJp5z9zG20qBtpbZRf%2Fljz2aBg%2F0bKeMIgmp1b3A82vqbobi1H2GFQ4DFkQ2IPLOhLDBUpSXgAk7XbmqQ%2BqaM0haw2RUjkSWd2dh%2FUz5N8gPqy27g5rH4EvDxrw5iCqANTLqyESCLojmD%2F%2Fl40I3KBk6vUNiX6fYn51iN2%2FL1ReVY5yZesDw%2BTAkLfaCaDPDMQwI7sTY44dFEGqh1BM18n4oMZ2h6zDLoJZc25cFSmSXT30re2Sc2tZyHY09twZkPo9%2BnHrSUeSGMUuTHHlQDNf%2BEv7VlBRYxoueM6lWMP7QT4zpy%2BeaOisNu92SpbAf4FusT9gSyim3vI8Zk%2Bu6emp3Q5ko%2FWWEDi%2FdUpAuA6y8lU0ZYX9EmLHu0GRcDOp%2FUT7kfYWYzq8oZuBkvtD1NfP%2Fg2Rr9u1E7hKMOvEt8EGOrEButifDMhjTDYP8Z6KjSJDEBoSJtdNM71lKC9McVU46SWbnGtem2AGGkQ2lo9M5ymlk05bx42w0%2BrzN6rkXj6vWuv%2FTMcu9GScGr9cfsenIG3Xea1jx7V0nNtitW8wNC97pE4cN5%2FGh4y7iOxtrikFhpvI2UfR%2FSsP74mmIJPnXDszSUliiso78G2mTkr6VNVc3Ap2MTdQTc%2FF%2Fjt98pwSpOBg2hC4mKpgZ7SPhm%2F977wm&X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Date=20250521T145554Z&X-Amz-SignedHeaders=host&X-Amz-Expires=300&X-Amz-Credential=ASIAQ3PHCVTY36JMMURL%2F20250521%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Signature=6e3f4d2a7a8272ac290cf015c690f69081310efe135c84970bc3c1f5ee76c8aa&hash=e0fc3bb08797dbde4a0d2a2f45a8b452ff98bc0ba3fa2f83dfa7ee4611f3f56e&host=68042c943591013ac2b2430a89b270f6af2c76d8dfd086a07176afe7c76c2c61&pii=S1877050913010661&tid=spdf-10d66fce-3783-4358-9716-835235c55ef0&sid=0671f5b63a551546d11a1550afd14a481028gxrqa&type=client&tsoh=d3d3LnNjaWVuY2VkaXJlY3QuY29t&rh=d3d3LnNjaWVuY2VkaXJlY3QuY29t&ua=0f165c54575006000205&rr=9434eadecb3043f4&cc=us)