Analysis on the environmental sustainability and impact of port activities (passengers flows) in the historical areas of the port of Ancona

D.3.2.1

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1. Introduction

This document has been drawn up in the framework of the activity "Preservation of historical tangible and intangible heritage in Italian and Croatian ports" (WP3.2) foreseen within the REMEMBER Project.

It aims to perform an “analysis on the environmental sustainability and impact of port activities with particular reference to passenger traffic, in the historical areas of the port of Ancona” (D.3.2.1) through the results of the analysis of vehicular traffic flows in the area of the old port and the environmental studies prompted to the construction of the new Molo Clementino.

It will also highlight potential critical aspects and improvements in terms of environmental impact resulting from an increase in passenger flow in the area of the old port of Ancona.

Specifically, the document summarizes the works produced by the Central Adriatic Ports Authority as part of the Strategic Environmental Assessment (SEA) procedures (technical performance specifications; SEA screening instance; SEA screening opinion) and the outcomes resulting from the study named "Analysis of the impacts on the road system generated by the construction of a new Cruise Terminal in the Port of Ancona" realized by “Steer Davies Gleave” Group for Central Adriatic Ports Authority.

a. Description of the port area

The port of Ancona is located in the centre of the Italian Adriatic coast and thanks to its geographical position it has a key function in the Adriatic-Ionian macro-region as the terminal of international ferry routes towards Greece, Croatia and Albania. In particular, the route Ancona-Igoumenitsa-Patras has become over the years the main route between Greece and Central Europe: Ancona is the first port for RO/PAX traffic between Greece and Central and Western Europe.

Moreover, the port of Ancona is one of the 83 strategic ports of call of the European Union and is included in the Scandinavian Mediterranean and Baltic-Adriatic Corridor.

It excels in the international ferry traffic, being among the first Italian ports for number of passengers and in the container traffic, exceeding 150.000 TEUs per year of traffic, thus attracting major container transport carriers worldwide.

The port is distributed over an area of 1.4 million square meters and consists of passenger and ferry terminals, container and general cargo facilities.

It is composed by 26 docks with a total length of 4.3 km and surface of 224,000 sqm with 12 areas to stock goods for a total surface of 125,000 sqm.

The port of Ancona is divided into the old port, which developed close to the city, and the more recently developed commercial port. In the port area are located:

- 4 shipyards for cruise ships and yachts;
- 11 docks, for a total of 7 berths for ferry and cruise ships, for a longitudinal development of 1’632 meters and over 71’000 square meters;
- 9 docks, for a total of 9 berths for ships used for container and bulk cargo traffic (solid goods) for a longitudinal development of over 1’700 meters and over 100’000 square meters of yards;
- one of the main Adriatic fishing fleets;
- the Marina Dorica tourist port;

– 3 berths for liquid goods handling at the service of the Falconara refinery, which handle approximately 4.5 million tons of goods per year.

2. New cruise terminal project: Molo Clementino

The intervention of docking of the external front of the Molo Clementino (old port), is defined as a strategic action for the development of the port of Ancona and is necessary to pursue the objectives of competitiveness on the cruise market. In fact, the project would allow the docking of ships up to 350 meters long, i.e., 20-40 m longer than the ships currently calling at the port of Ancona.

a. Project overview

The project is located in a historical area of high archaeological interest, therefore the quay will be realized on the basis of the principles of sustainability, with the utmost respect for the value and uniqueness of all the monumental assets present in the old port, such as, for example, a section of the city walls built in the II century B.C. (city side); the Clementine Arch designed by Vanvitelli (XVIII century A.D.); the Trajan Arch attributed to the architect Apollodoro Damasco (100-116 A.D).

The New Cruise Terminal in the old port area provides a total linear development of 354 meters and an area of about 2,400 m2, equipped with:

- two parking areas located at the ends of the pier;
- a driveway connecting to the existing road network that will run alongside the parking area dedicated to Fincantieri employees (from the north of the historic walls to the junction foreseen at the Facility 2B gate).

In particular, the project includes the translation to the south of the current traffic circle (now located near the actual entrance to the shipyards) close to the future entrance, wider than the current one, capable of serving a greater number of vehicles (vehicle flows generated by ferry traffic, Fincantieri and cruises).

In conjunction with the docking work, further changes to the current port layout are also planned, which have been taken into account in the analysis of traffic flows (chap. 4) such as:

- relocation of the parking area for commercial vehicles awaiting customs clearance at Scalo Marotti;
- creation of a multilevel parking facility (currently Fincantieri parking area) for cruise passengers who choose to reach the Ancona home-port with their own vehicle.

3. Environmental studies

The following paragraphs provide a brief description of the regulatory context in which the above-mentioned intervention is placed.

In addition, the advice given by the competent environmental authorities (SCA- Soggetti Competenti in materia Ambientale) regarding the Strategic Environmental Assessment (SEA) of the quay intervention will be presented.

a. Regulatory framework

The intervention of quaying of the external front of Molo Clementino constitutes a localized variant to the Port Master Plan of the Port of Ancona, adopted by resolution No. 19 of the Management Committee of Central Adriatic Ports Authority on 23.07.2019.

Following this adoption, an application was submitted to the Marche Region for assessment of compliance with the Strategic Environmental Assessment pursuant to art. 12 of Legislative Decree no. 152/2006 and in compliance with the provisions of art. 5 of Law no. 84/94.

Moreover, since the above-mentioned intervention will involve "modification or extension of projects [...]" included in Annex II of Part II of Legislative Decree 152/2006, it will be required to undergo Environmental Impact Assessment (EIA) at the Ministry of Ecological Transition.

Therefore, it is foreseen that the intervention is subjected to an EIA-SEA integrated procedure through a single measure.

i. Relevant environmental legislation

- Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment: it introduces the Strategic Environmental Assessment procedure in the European legislative system.
- Legislative Decree n.152 of 03.04.2006, adopting the Directive 2001/42/CE, regulates "Environmental regulations" and in Part II the "Procedures for strategic environmental assessment (SEA), environmental impact assessment (EIA) and integrated environmental authorization (IPCC).
- Regional Law n.6 of 12.06.2007 "Modifications and integrations to regional laws 7/2004, n.3/1992, n.28/1999, n.16/2005, n.10/1999. Provisions on environmental matters and Natura 2000 Network."
- Resolution of the Regional Council n.1813 of 21.10.2010 "Update of the regional guidelines for the Strategic Environmental Assessment referred to in DGR 1400/2008 and adaptation to the d.lgs.152/2006 as amended by d. lgs.128/2010.

b. Environmental analysis

The opinions provided by the SCA listed below demonstrate the need for the SEA procedure to evaluate mitigation measures and to monitor the environmental, economic and social effects produced by the project. In addition, the SEA procedure forsees both public participation and the achievement of sustainability goals through the implementation of tangible actions.

The Marche Region (Land Protection, Management and Planning Service) deems that the adopted localized variant is not in contrast with the Regional Plan of Ports approved in 2010 and that the

change of use of the port area uses (from strictly port to mixed urban use) would allow the integration of the sea front with the city and the reorganisation of the traffic system.

The Superintendence of Archaeology, Fine Arts and Landscape of the Marche Region provides a positive opinion in general considering the intervention of the dock of Molo Clementino not significant in terms of visual impact and perception of protected assets in the area. It also considers it essential to activate verification procedures of archaeological interests prior to the beginning of works, since this is an area of "high archaeological risk".

The Harbourmaster considers that there are no reasons to prevent the variant from being submitted to SEA.

The assembly of Ambito Territoriale Ottimale - Marche Centro - Ancona (AATO2) also expresses a positive advice with prescriptions regarding the water and sewage service.

The Azienda Sanitaria Unica Regionale (ASUR), expressing a favorable opinion, requests an analysis of the interaction of pollutants produced by ships while in port with the neighboring population, highlighting the need for mitigation and compensation for any harmful effects resulting from the implementation of the General Regulatory Plan (PRG).

The Agenzia Regionale per la Proteione Ambientale delle Marche (ARPAM) provides observations referring mainly to 4 environmental matrices: biodiversity, waste, air, noise. Specifically, it remarks the following:

- need to characterize the protected species and biocenosis in order to hypothesize possible impacts (from underwater surveys and analysis of samples carried out for the sunken Sunrise, however, the presence of protected species has not emerged);
- need to assess maximum capacity of storable/treatable waste;
- need to evaluate possible influences of the increase in maritime and land traffic on air quality (the site is located in an area at high risk of environmental crisis-ERCA);
- need for indications regarding the noise impact resulting from the activities of the new terminal and the surrounding areas.

4. Analysis of vehicular traffic flows in the port area

The study commissioned by Central Adriatic Ports Authority regarding the vehicular traffic induced by the arrival of large cruise ships has the objective of estimating its impact on the port's road system, taking into account:

1. the increase in flows within the port and the relative new road configuration;
2. the interference with traffic linked to ordinary port operations.

a. Current traffic condition

According to the study objective, the defined area for the analysis includes the Port of Ancona and the connecting road system to the main road network (length about 4KM), including all accesses to the port area from the city road system (both directions) and then divided into the following sections:

- Enrico Mattei Street (T1);
- Mandracchio, Mole Vanvitelliana area (T2);
- Piazza della Repubblica gate (T3);
- Vanvitelli waterfront, proximity of facility 2B gate (T4).

The data, summing up the four sections and analyzed over a 72-hour period (Thursday, Friday and Saturday) reveal the following:

- Thursday-Friday: a practically similar trend, with a prevalence of traffic linked to the Port's regular operations, known as "background" traffic (e.g. offices and Fincantieri). In fact, peaks of light vehicles were registered between 06.30-08.30 and 16.30-18.30;
- Saturday: different trend, with lower average flows;

- Heavy vehicles: show a more linear trend during daylight hours (all three days) with peaks due to the disembarkation of some ferries[1].

In conclusion, the overall so-called "background" traffic recorded in the four sections is greater on Thursdays in the morning rush hour than in the afternoon rush hour, specifically, there were about 2,060 vehicles between 7.15 and 8.15, against the 1,960 recorded between 16.30 and 17.30.

In the current scenario, for the reference period, road mobility in the selected portion of the territory - adding all the vehicles circulating on the network - amounts to approximately 1,600 vehicles per hour.

b. Scenario of expected flows

In order to analyze the traffic scenario expected from the entry into operation of the Molo Clementino, attention has been focused on afternoon traffic, as it will be during the afternoon that the most critical congestion will occur.

Taking into account the sum of three traffic components ("background" traffic on Thursdays; “ferry” traffic linked to the movements of 4 ferries on a peak summer day at full load with about 2700 vehicles between disembarkation/embarkation and finally “cruise” traffic, modelled on data from similar ports - Savona in particular - and relative to a cruise ship with the same dimensions as those expected at Ancona) the following two scenarios are expected:

- «Worst case» (13.30-15.30): most stressful condition for the system. In this range, it is assumed that the road network is subjected to the strongest stress condition.

  The “ferry” component acquires considerable importance in numerical terms: the arrival of four fully loaded ferries in the space of an hour (between 13.30 and 14.30) submits the network to considerable stress due to the vehicles disembarking, which are overlapped by a

[1] Data based on the 2016 summer season: arrival and departure of 4 ferries with very close schedules (1:30-2:30pm time slot).

minority quota of vehicles heading towards embarkation. During this time frame, the "cruise" component is numerically marginal compared to the sum of the "ferry" component and "background" traffic.

The total number of vehicles in the central hour of simulation (14.00-15.00) is estimated to be about 3,000, almost a double of the hourly vehicles on the network, divided as follows:

- about 1,600 vehicles of the "background" component (assumed constant compared to the current scenario);
- around 1,300 vehicles for the "ferry" component;
- around 110 vehicles for the "cruise" component.

- Afternoon peak (16.00-18.00): considering the following hypotheses, i.e. greater concentration of vehicles arriving at the embarkations (section T4) during the afternoon peak of "background" traffic (16.30 and 17.30) and the overlap of the afternoon peak component of the cruises, the following results were observed:
  - a little more than 2,000 vehicles from the "background" traffic (found between 4.30 pm and 5.30 pm)
  - around 300 vehicles for the "ferry" component (15.30-16.30);
  - 160 vehicles related to cruise operations (3.30-4.30 pm).

c. Critical issues and solutions for improvement

In the two scenarios there are some potentially critical factors, whose negative effect can be limited or eliminated through the introduction of traffic regulation measures and infrastructure interventions.

«Worst case» scenario.

Road nodes	Type of criticality	Causes	Phenomenon detected	Improvement action
Da Chio gate	temporary	• exit vehicles from the customs gate in south direction	• Slowdown phenomena in southbound direction (exit customs gate); • Queues for maximum 200/250 mt.	Phenomenon exclusively detectable between 14.30-15 that disappears automatically after 15.
Mandracchio/ Marotti area	temporary	• heavy vehicles exit from the parking lot; • vehicles heading to Scalo marotti	• slowdown between the disused level crossing and the traffic circle westbound (port exit).	**Regulation interventions** at the exit of the Marotti area, such as: call traffic lights to regulate the flow of outgoing trucks (it can be activated only in the hours of greatest inflow 14.30-15).
Mattei/Einaudi Streets, port area access	hard	• City traffic; • light and heavy vehicles heading for the ticket offices; • disembarking vehicles heading for the highway.	• Queues over 300 meters in direction of embarkation; • strong slowdown for arrivals.	Two **interventions of traffic management** during the periods of higher vehicular flow: 1. use of the direct exit from the ticket office parking lot for boarding, routing vehicles directly to this exit without re-engaging the traffic circle; 2. use of the South Pier - Via Einaudi route for vehicles leaving the port area. With reference to this point, the realization of an **infrastructural intervention** is suggested: 3. dedicated lane for the right turn of vehicles coming from Via Einaudi and directed to Via Mattei, avoiding the use of the traffic circle.

«Afternoon peak» scenario

Road nodes	Type of criticality	Causes	Phenomenon detected	Improvement action
Mattei/Einaudi Streets, port area access.	hard	• City traffic; • Light and heavy vehicles heading for the ticket offices and embarkation points.	• queuing phenomena with lengths of about 1 km (from the traffic circle to the railway overpass).	During the hours of greatest flow of boarding vehicles, it is necessary to use the direct exit of the ticket office parking lot, in order to lighten the load on the traffic circle.
Fincantieri entrance/ New Cruise Terminal	hard	• Control operations at Facility 2B (average times estimated to be: 120 seconds for cars and 90 seconds for heavy vehicles).	• phenomena of severe slowdowns.	**Infrastructural solution**: a parking area located upstream of Facility 2B - equipped with a direct connection to the control gates - to prevent queued vehicles from interfering with the vehicles travelling along the traffic circle that gives access to the Cruise Terminal and Fincantieri.

d. Impact of the Cruise Terminal

This paragraph reports the results of a specific analysis on the impact of vehicle traffic caused by the construction of the New Cruise Terminal only. In particular, some transport indicators were compared for the two future scenarios previously examined against the case in which the Cruise Terminal would not be realized and including, however, the improvement interventions highlighted in the previous paragraph.

Anticipating the conclusions, the impact of these vehicles on the circulation status of the port road network is marginal.

i. Average delay of vehicles on the network[2]

The impact of the increase in traffic due to cruises in terms of average delays has no influence on the creation of slowdowns or queues. Even where slight queuing phenomena occur (the highest values in fact slightly exceed 20 seconds in the afternoon peak), this cannot be attributed to the increase in traffic due to the cruises.

In the "worst case" scenario, the trend in delays reflects the trend in demand, with an increase in values between minutes 60 and 90 (coinciding with the simultaneous disembarkation of the four ferries); from about minute 90 (corresponding to 15.00 of the simulation), the average delay drops to values in the order of 10 seconds.

In the "afternoon peak" scenario, delays tend to increase until they settle at around 20 seconds after 90 minutes (around 17.30). These relatively higher values are due to the concentration of vehicles waiting at the Facility 2B gate.

ii. Numbers of vehicles operating on the network [3]

An increase in this indicator over time may generate queuing phenomena.

This indicator also shows a very similar trend between the hypothesis with and without the vehicles induced by the construction of the Terminal; the difference is exclusively due to the difference in overall demand (cruise component).

The "worst case" scenario shows a peak in the number of vehicles circulating at the same time as the disembarkation of the four ferries, which, however, as already shown by the analysis of all the previous indicators, settles at lower values after minute 90 (15.00).

[2] It represents the time wasted (in seconds) by each vehicle travelling on the road network, due to congestion, slowdowns or queues.

[3] It represents the number of vehicles circulating on the network, minute by minute, that engage the road segments, moving towards their final destination.

The "afternoon peak" scenario sees the trend in the number of vehicles on the network remain more or less constant, with around 200 vehicles present on the network. In fact, the gradual accumulation of vehicles waiting at Facility 2B balances the gradual general decrease in demand.

iii. Driving times[4]

With regard to driving times, the analysis was conducted specifically on the Via Flaminia (junction with Via Mattei) - Fincantieri/Cruise Terminal entrance (traffic circle) route in the two directions: the difference between the data emerged, with and without the flows induced by the new Terminal, is minimal.

In the "worst case" scenario, the impact of flows induced by the construction of the Terminal increases the duration of the route by no more than 10 seconds (northbound towards the Terminal); it becomes worse in the southbound direction, during the simultaneous disembarkation operations of the four ferries. Even without the demand related to the cruise component, an increase in driving time of about 2 minutes and 30 seconds can be observed, up to about 10 minutes (600 seconds), compared to an average value of about 7 minutes and 30 seconds (450 seconds) found in the first hour of simulation. With the construction of the Terminal and considering the induced demand, a further extension of the exit driving time of about 50 seconds is recorded, bringing the duration of the route to just under 11 minutes.

In the "afternoon peak" scenario, the maximum displacement slightly exceeds 20 seconds.

[4] It represents the time required to complete a given itinerary.

5. Conclusion

This paragraph summarizes the conclusions emerging from the study requested by Central Adriatic Ports Authority on the impact of vehicular traffic produced by the entry into operation of the new Molo Clementino and the environmental studies carried out on this subject.

The volume of traffic induced by the mooring of large cruise ships and therefore by the construction of the new Cruise Terminal is, overall, sustainable from a road traffic point of view.

Considering the increase in flow inside the port due to the cruises and the interference with "background" traffic, the impact on the port road system of the new Cruise Terminal is completely acceptable without the appearance of phenomena of persistent criticality.

In the event of slight, temporary critical situations, such phenomena cannot be attributed to the traffic caused by the new Cruise Terminal and can be resolved through improvements in traffic regulation (e.g., traffic lights), management (e.g., alternative routes) and infrastructures (dedicated lanes, parking area).

From an environmental point of view, the effects arising from the planned intervention are hypothesized, in particular, on the environmental matrices highlighted by ARPAM, such as biodiversity, air, waste and noise and with regard to the emissions of the ships stopping at berth (ASUR), reason why the project of the New Cruise Terminal is subject to the SEA procedure.